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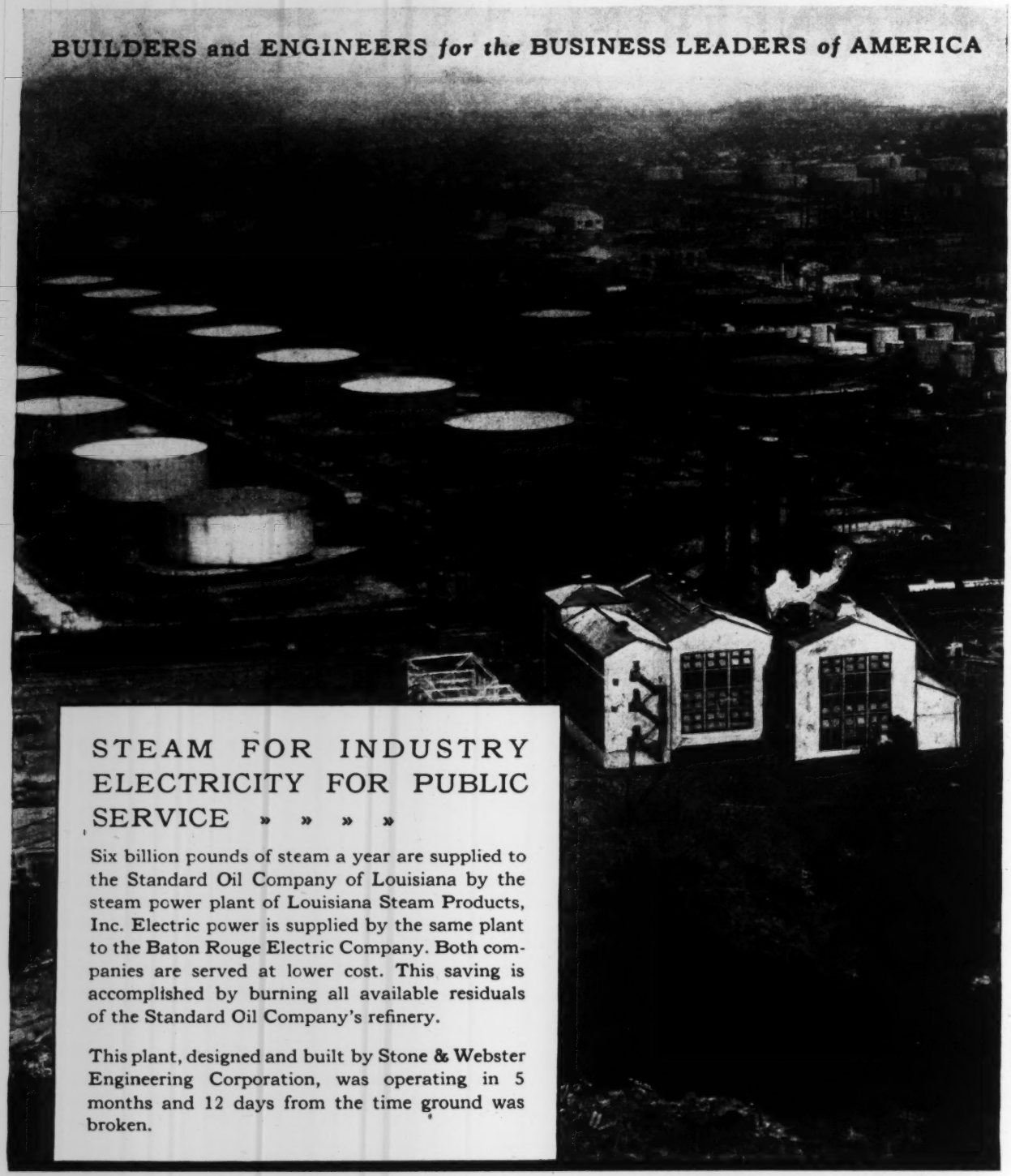

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DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 106 NEW YORK, JUNE 4, 1931 Number 23

Low Streamflow Predicted

LESS than twelve months ago, when week after week of rainless days first began to cause anxiety, the question of groundwater influence on streamflow gave rise to numerous sharp discussions. Some engineers correlated the abnormally low river stages in some parts of the country with the known low stage of groundwater. Others denied that groundwater influences the volume of flow appreciably. The case is now largely cleared by the finding of the United States Geological Survey that low-stage streamflow comes mainly or wholly from the underground reservoir, and that even in a wet year an abnormally low watertable is apt to mean abnormally low summer and fall river discharge. This finding is of value in bettering the general understanding of hydrologic phenomena. It is of directly practical value in emphasizing the carryover function of storage, whether the service be navigation, water supply or power. And, what is still more directly practical, it renders the timely service of foretelling a continuing deficiency in dry-season streamflow, warning all communities dependent on stream supply that for this year they must look to direct runoff alone to build up their stored reserves.

A Competent Art

MANY doubts have been voiced in recent times as to whether the art of making and placing concrete is sufficiently advanced to be able to cope with the task of building the Hoover Dam. Shrinkage, heating during set and subsequent cooling, continued distortion under load, and similar physical secondary effects have become much magnified in the view of some, even to the point of suggesting that the great dam could not be made safe under current methods of design and construction. Because of such apprehensions it is a satisfaction to learn that the board of experts on cement and concrete which the Bureau of Reclamation called together to pass on all questions of concrete making has indorsed the plans and specifications. The materials proposed, the methods of mixing and placing, and all associated features of the work as specified are approved as adequate to produce a satisfactory structure. Because of the advantage that will be derived from a cement of lower heat evolution, the board proposes to study the possibilities of commercial production of such a cement; and this proposal is the more reasonable since the high-strength cement of today develops heat more rapidly, and perhaps in larger total amount, than the cements of a decade or two ago. In addition to this research, the board also plans to carry on laboratory study to give exact information on certain parts of the construction procedure, including mixing time, premixing of cement and water, cooling methods and others. The investigations will be of decided value to the Hoover Dam work as well as to the concrete art generally. But the report says clearly that even without them the concrete art is competent to carry out the work.

More Travel Comfort

HEARTENING NEWS has come to those who must spend much time in railroad travel during the summer months: Two air-conditioned trains have been put into service between New York and Washington to test out the practicability of air conditioning in railway service. If they prove successful, similar trains soon may be expected to be put into service elsewhere. Who has not sweltered in a sun-baked railway coach, swept by dust and cinders from windows opened in a vain attempt to keep cool, and harassed by the added noises that the open windows bring? All this is to be done away with on the two trains that the Baltimore & Ohio is testing out. Air is drawn in at one end of each coach, is freed of dust and excess moisture, is then cooled and finally is circulated through the car. Windows are kept closed to exclude dust, noise and over-heated air. The passengers ride in an ideal atmosphere regardless of outside conditions. Of course air conditioning is not new in itself, but its application to moving trains is an innovation. The B. & O. experiment will have to show not only increased passenger comfort but also sufficiently low cost per passenger to make the improvement feasible. Success in the undertaking is to be hoped for. No one improvement in railway service holds so much promise of advancing the status of travel by rail

Legislative Inaction

CALIFORNIA has a regrettable experience in delay of public works due to legislative inaction. Its legislature has failed to take action in the vital matter of the state's water-development plan—a characteristic example of the not uncommon tendency of legislative bodies to sidestep a difficult task even when urgent. Water is a serious problem in the state, and the approach of a summer runoff season that promises to be seriously deficient may soon make it even more serious. In consequence the governor may call a special session to deal with the plan. The complexity of the problem is such that free discussion and open-minded consideration of debatable points are essential to agreement on the plan. Wide differences of view may be expected on the claims of different regions, on choice of projects for immediate development and on allocation of benefit assessments. However, the state engineering department has been en-

gaged in an intensive study of the problem for a decade, at the direction of the legislature, and the facts it has developed and the program it has worked out are so well supported that even the legislature's committee did not vary the general features of the plan outlined by Edward Hyatt, state engineer. Legislative action to carry the project to execution is the necessary next step. If this step is further delayed, the legislature can hardly avoid convicting itself of neglect of duty.

Recreational Engineering

THAT the engineer's works have added to the comfort and convenience of his fellow man is generally conceded, but that he also helps to increase the pleasure of our leisure moments is less well known. Yet there is a large and ever-increasing list of engineering structures built largely or entirely for the service of recreation. The Eiffel Tower, that pioneer masterpiece of steel construction, serves the sole purpose of providing a vantage point from which sightseers may obtain a view of Paris. Inclined railways and cableways that carry tourists to scenic points in mountain regions here and abroad serve a like purpose. Scenic highways are not uncommon, and the automobile ferry across the Straits of Mackinac, established and operated by the Michigan state highway department, carries predominantly tourist traffic. In the field of building construction, witness the stadiums, arenas, auditoriums and other structures, large and small, devoted entirely to entertainment, not to mention the structural complications that have been introduced into hotel and apartment house design to provide unobstructed spaces for ballrooms, swimming pools and other recreational areas. Our national parks are replete with further examples. In the Carlsbad National Park, in New Mexico, the federal government is planning to sink a 750-ft. shaft to take a continuous-run elevator. Much of this engineering is equal in rank to that of more utilitarian kind. It requires no less competence to secure adequate return from the funds expended and what is even more important to assure safety.

On the Threshold

THE FIRST of a series of articles on wind design for tall building frames is presented in this issue. The five articles in the series comprise discussions of an article published in the Feb. 19 issue which attempted a statement of the general principles and philosophy of several current wind design theories. Such active thinkers in the field as Albert Smith, David C. Coyle, Henry V. Spurr, Clyde T. Morris and Robins Fleming among others present their stimulating views. In main aspect the discussions invite comparison with Fleming's well-known articles published in this journal some fifteen years ago. At that time wind design procedure was drifting aimlessly, with every new building receiving the benefit of a different theory or whim that at the moment seemed to the designer to be logical. Fleming brought the current practices together, classified and analyzed them, and wind design thereafter assumed some semblance of order. It was a complex problem, however, and its complexity has grown as the character of building has changed from low broad-based structures to slender, flexible towers. The old methods did not prove entirely satisfactory, particularly when measured by the degree of vibration that they permitted in the frame. Revised theories were evolved, and we are today in need of another consolidation of ideas. The new height range into which modern buildings are being pushed requires a more scientific approach to the problem than the old theories provide. Wind design may be and probably is an art. But it is also a science that must be measured in scientific terms. Comfort for occupants as well as safety, stability as well as strength, need to be assured. The series of articles that begins in this issue should be read and critically analyzed by every structural engineer. Wind design is his major problem today as we enter a new era in building construction.

Don't Maim a Child!

SCORES of children, maimed or blinded by blasting caps, can blame their unfortunate plight upon careless users of explosives. At this time of year, when children begin to play out of doors, warns the Institute of Makers of Explosives, the pitiful toll of blasting-cap accidents rises at an alarming rate. The shiny blasting caps are fascinating playthings to the youngsters. The responsibility of keeping the deadly caps out of their hands rests with the users of explosives. Keep the caps in charge of responsible and careful parties. See that no caps are left lying around loose, or left unguarded or not locked up securely. Don't let *your* blasting caps maim a child !

Asphalt Simplification

SOME years ago, before the simplification of paving bricks, no less than 66 sizes of brick were being specified for paving. When the simplification movement began it was believed that paving brick afforded the worst example of vagary in choice of a single material for identical use. But as now appears it was never even a close second to asphaltic road materials in variety of demand. Specifications for asphaltic materials are uncounted: virtually every agency for road construction—state, county or city—has its individual specification.

This variety is a burden on both producer and user. It does not benefit either road quality or comfort, but is a large idle expense and hampers efficient business and technical advancement. Brick manufacturers and paving engineers very sensibly worked together to eliminate useless variety. In a standing committee sponsored by the Department of Commerce they reduced the number of paving brick sizes to one-tenth of the original. The six surviving sizes, with a few others of special shape, are now serving satisfactorily all the purposes for which more than threescore sizes were formerly demanded. So, it is believed, will a very small number of the existing asphalt material specifications satisfy all service needs.

A well-organized effort has been started to bring about this simplification. During the present year five group conferences of the Bureau of Public Roads, state highway officials and the Asphalt Institute have agreed upon a scheme of analysis and have set up the machinery for accumulating during 1931 tests data to serve as a basis for writing common specifications.

This is an excellent beginning if it is kept in mind that successful simplification extends beyond the fairly easy process of reducing the number of specifications. No curtailment, however logical and constructive, will succeed unless it is supported by the close adherence of asphalt producers to the limits laid down and unless it

provides for changing these limits as practice develops the need. Conscientious adherence of the manufacturers and a permanent bureau for size revision have been the major factors in bringing paving brick standardization to a workable procedure. They will be equally essential to successful asphalt simplification.

Backbone Needed

STRUCTURAL engineers engaged in the building industry find one problem continually confronting them that is quite as perplexing as are some of the well-known technical questions. This problem is the one of securing adequate compensation for services rendered. Wherever structural engineers gather, the question of fees is a live topic, and often of late the consensus is that direct employment by the owner rather than through an architect is the only panacea. Is such a reform, if reform it be, wise?

In the building field the structural engineer is usually employed by the architect, who as the owner's representative directs the job. If the architect knows his business, if he has due regard for his own reputation, if, indeed, he holds the owner's best interests at heart, he will insist upon a fee that is adequate not alone for himself but for the structural engineer who will design the framework for him. There are such architects, many of them. But there are also others who through lack of backbone permit the owner to pare their fees to the danger line. Not much then is left for the structural engineer, and being inadequately paid he is hampered in doing his best in furnishing the owner a safe and efficient structure.

The structural engineer who accepts employment from such an architect, known for his fee-cutting proclivities, is of course open to the same charge of lack of character and backbone as is the architect. Whether the engineer would show more professional and personal fortitude in dealing with the owner direct than he now does with this type of architect is a moot question. But upon the answer to it would seem to depend the success or failure of a direct-with-owner contract.

Those attempts which have been made to correct the evils of inadequate compensation and fee cutting have usually been in the nature of appeals broadcast to the public, based on the possibly truthful but nevertheless assumed fact that modern buildings would be built better if the structural engineering were handled differently. Such appeals are largely fruitless because of public apathy and lack of knowledge. So far as memory serves, no serious attempts have been made to enlist the help of the architect, who obviously is the key factor in any projected change. This is the more surprising because the architect, better than anyone else, should understand the difficulties of the structural engineer, which in many respects are the same as those confronting the architect himself.

Admittedly, fee cutting is not practiced by the best architects; their business is so handled that it is not necessary. Perhaps, as some structural engineers maintain, these architects would not suffer any disadvantage in permitting the structural engineer to deal direct with the owner, so long as the architect reserved the right to compel the owner to retain a structural engineer satisfactory to him. The same structural engineers also maintain that the other architects, who are always on the ragged edge and who resort to cutting structural engineering fees because their own fees have been unmercifully cut by the owner, would probably welcome a divorce from financial dealings with the engineer.

If these suppositions be true, the advisability of enlisting the help of the architects is all the more apparent. Fee cutting and compensation are questions for arbitration between architects and engineers. The present year should see some progress made in this direction. Also it should witness progress on the part of structural engineers in resisting the efforts of certain architects to reduce engineering fees to a dangerous minimum. Backbone is what is needed first and in largest degree. Conferences between architects and engineers concerning their mutual problems will then produce the required results. Mutual welfare is the only basis upon which both the architect and the engineer can survive, and it is the basis upon which the owner can rest his assurance of safer, more economical and more efficient buildings.

Rights of Water Areas

EVERY so often there comes to the surface a scheme to make more land near some center of population by filling in adjacent waters. No one takes seriously the age-old proposition to extend Manhattan Island southward over Governors Island and on to Robbins Reef, but ample support is given to plans for filling along the shores of Lake Michigan opposite Chicago. Not long ago there was a scheme, backed by prominent names, to fill the whole yacht harbor off Grant Park, Chicago's front yard. Now comes a project for a municipal recreation island of several hundred acres offshore, with perhaps an auditorium for the 1932 political conventions. Do such schemes give adequate recognition to the claims of water areas?

Engineers familiar with dredging and filling say that a 100-acre island outshore of Chicago could be built within a year, at a cost not much over $50,000 per acre. The spoil from Chicago's subway excavation—will it ever be started?—would provide some 18 million cubic yards, more than enough to fill in a 300-acre island in 20 ft. of water. And half a million yards of waste and excavation is now available each year as the city's surplus, dumped a dozen miles offshore but obviously more useful if put into an island fill than if allowed to roil the lake waters, as it now does during storms. From the construction and financial side the scheme appears feasible. But its actual justification has not yet been shown.

Land areas tend outward into water areas constantly, attempting to gain more land—of high value—at the expense of water area—assumed to have no value. But is this movement to be decided by mere cost-of-construction calculations? Water areas have a real though undetermined value; they have some rights that should be respected, some justification for their existence and survival! The advantages of water frontage are so evident that, were Chicago to be removed a few miles from the lake, it would doubtless be ready to pay great sums for bringing the lake to its door. Yet that same resource close at hand finds no one to value or defend it.

City-planning bodies could take this matter of water areas as one of their prime concerns. It has more claims than many of the academic matters that now engage such planners. Study of the real needs of Chicago, we surmise, might show that it would be more logical to fill up the city's odorous river and leave the lake as nature made it than to reverse the procedure.

Martinez-Benicia bridge of the Southern Pacific Railroad
In the lift span a load of 1,580 tons is raised 65 ft. to provide a 135-ft. clearance.

Design and Erection of the Martinez-Benicia Bridge Superstructure

Special steels used extensively—Earthquake-resistant provisions—Spans erected on movable steel-truss falsework—Lift-span design and safety provisions

By S. A. ROAKE
Chief Designer, Southern Pacific Co., San Francisco, Calif.

FORMAL OPENING of the new Southern Pacific double-track railroad bridge across Suisun Bay on Nov. 1 completed this $12,000,000 improvement project and terminated the half century of train-ferry service that the company has maintained across the upper waters of San Francisco Bay between Port Costa and Benicia, about 2 miles west of the site. Outstanding features in the superstructure construction are the economic use of silicon steel and heat-treated eyebars pretested to full-load capacity, consideration of earthquake forces in the design, the erection scheme and the 1,580-ton 328-ft. vertical lift span providing a 135-ft. clearance over the main channel, together with the notable provisions for its safe operation. Erection of 20,000 tons of steel in the nine truss spans, the lift span and towers and the viaduct aproaches was accomplished in eleven months. Foundation construction was described in detail in *ENR*, Jan. 30, 1930, p. 174.

Design Characteristics—Essential data on the major divisions of the superstructure, including span lengths, weight and the proportionate use of special steels, are shown in the table on p. 921. Stress calculations were based on an assumed live load of two Cooper E-90 locomotives followed, preceded, or both, by a uniform load of 7,500 lb. per linear foot on each track. For maximum stresses with both tracks simultaneously loaded 90 per cent of the specified live load was used. This loading represents ultimate permissible motive power and train loads and is far in excess of present requirements.

Sectional areas for members were determined by the following unit stresses given in lb. per sq.in.:

1. Axial tension, net section: structural grade (carbon) steel 21,300, silicon steel 32,000 and heat-treated eyebars 36,000.

2. Axial compression, gross section: structural grade steel $20{,}000 - 70\frac{l}{r}$, but not to exceed 16,500; silicon steel $30{,}000 - 105\frac{l}{r}$, but not to exceed 24,750.

3. Shear: structural grade steel 16,000, silicon steel 24,000.

4. Power-driven rivets: shear 16,000, bearing 32,000.

The length and type of spans adopted were such that customary methods of analysis were followed in the design calculations. Top-chord joints of the truss spans are riveted, and pin connections are used at the bottom-chord joints. Secondary stress analysis resulted in slight reductions of unit stresses to specified limitations.

The possibility of earthquake-induced stresses was included in design considerations assuming a horizontal acceleration of $2\frac{1}{2}$ ft. per second per second. No additional sectional area was provided in truss members, but the spans were anchored to the piers against this horizontal movement. Longitudinal and transverse ribs projecting downward from the bottom of the steel-truss shoes were grouted into slots left in the concrete pier tops. The anchor bolts are not relied on to resist horizontal forces of this magnitude. The concrete piers carrying trusses are heavily reinforced with steel to resist shattering due to earthquake disturbances.

The method of erecting the superstructure at the 70-ft. clearance above mean higher high water was one of the major construction problems of the project. The scheme adopted by the contractor of floating a low-level deck span successively into each opening, using it as a falsework span upon which to erect the permanent through spans, and finally using this erection span as a part of the completed structure proved most satisfactory. Clearance between the piers of the main 526-ft.

through spans permitted the use of the 504-ft. deck span, ultimately used on the north end, to fit between the shafts and rest on the projecting rectangular bases with the aid of partly submerged steel erection bents. The end shoes of the deck span were landed on this bent just above high-water line, which placed the plane of the top-chord at the proper elevation for the timber blocking required to give the correct camber to the through spans.

Truss panel lengths were identical for the seven 526-ft. through spans and the 504-ft. deck span, except at the ends of the latter. For erection purposes no stringers were used on the deck span, which reduced the floated weight to about 1,750 tons; this load was safely within the capacity of the two 1,000-ton barges used. When in position, first the floor beams of the through span were set in place on the timber blocking, which rested on floor beams of the deck span; then stringers were erected to support the deck. This procedure enabled the locomotive crane to move forward to set the panel of steel in advance. With the deck in position the bottom-chord eyebars were placed, the verticals and diagonals were set up and the pins driven, followed by the top chords and swaybracing. Four 500-ton hydraulic jacks at each pier lifted the through span until it was free of the blocking, permitting the erection span to be floated out and warped into position for the next span. The through span then was jacked down to its permanent position.

For erecting the 328-ft. lift span, the same deck span with five of its twelve panels left off was utilized in the same manner. The operations of placing and removing the erection span were performed at favorable tidal elevations, but final placing on and lifting from the supports was accomplished by the use of 500-ton hydraulic jacks on the barges. The storage yard for bridge steel was located near the south abutment. Erection, with the exception of the northerly 220-ft. viaduct, progressed continuously toward the north, locomotive cranes handling the material brought up on flat cars as required. Both tracks were available.

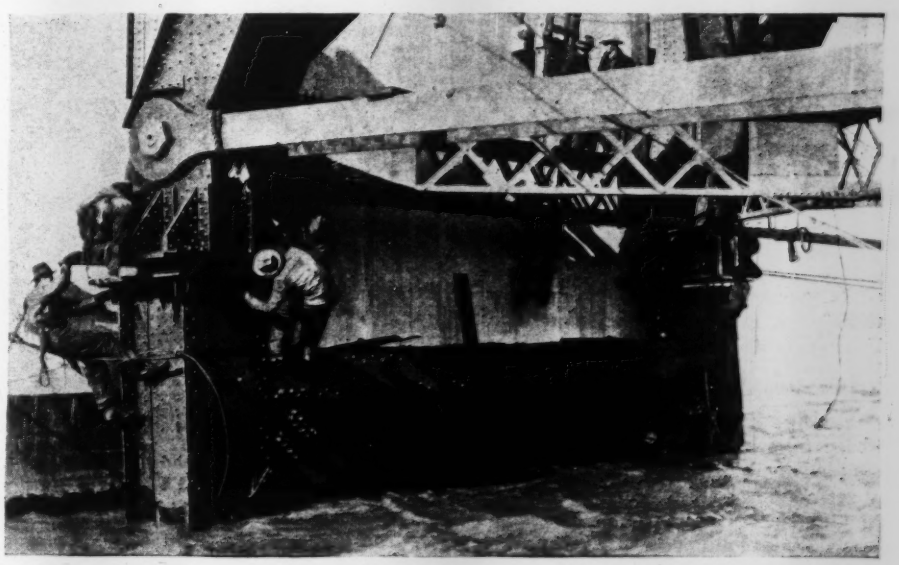
Lift-Span Design — The vertical lift span designed by Waddell & Hardesty, consulting engineers, is a double-track through riveted Warren-truss span, 328 ft. c. to c. of end bearings, with trusses 45 ft. deep at the end panel and 62 ft. deep at the center panel. From the low position providing a 70-ft. clearance it can be raised 65 ft. to a high position with a 135-ft. clearance above high water. The machinery and control apparatus are housed in a two-story structure within the trusses and above the tracks at the center of the span. The concrete counterweights are suspended in towers built up from the first panel of the adjacent fixed spans.

Complete with all machinery, timber deck and tracks, the lift span weighs about 1,580 tons and is carefully balanced by the two counterweights to reduce power consumption for operation to a minimum. To overcome the inertia of the span and counterweights and to lift or lower the span against frictional resistance a distance of 65 ft. in 90 sec., two 150-hp. electric motors are provided; also, for emergency, a 200-hp. gasoline engine is installed.

Each end of the span and its concrete counterweight are suspended by means of thirty-two $2\frac{1}{4}$-in. plow-steel cables, which pass over four 15-ft. cast-steel sheaves (eight cables to each sheave). These cables are fastened to adjustable eyebolts attached to a lifting girder that is riveted to the top of vertical end posts, thus suspending the span at each of its four corners.

To secure equalization of the loads carried by each counterweight cable, the tension in each was tested and adjustments made by means of the eyebolts. The tests were made from platforms in the towers near the mid-point of the stretched length of cable when the span was down, and the counterweights were lowered from the temporary supports until the cables were pulled taut but not heavily loaded. Each cable was pulled sideways to cause it to vibrate and then adjusted until its vibrations, during a selected time interval, were in agreement with vibrations of the others. For this bridge the cables were adjusted to about 24 vibrations in 15 sec.

The sheaves are supported by girders riveted to the main columns at the top of towers transmitting the dead-load reaction from half the span and one counterweight directly to the pier through the two massive steel columns, which also serve to guide the span during lifting or lowering. In raising and lowering, the span is restrained from lateral movement at the expansion end and from either lateral or longitudinal movement at the fixed end by means of roller guides located on the moving span in the plane of the top and bottom chords and traveling on guide surfaces attached to the vertical tower columns.



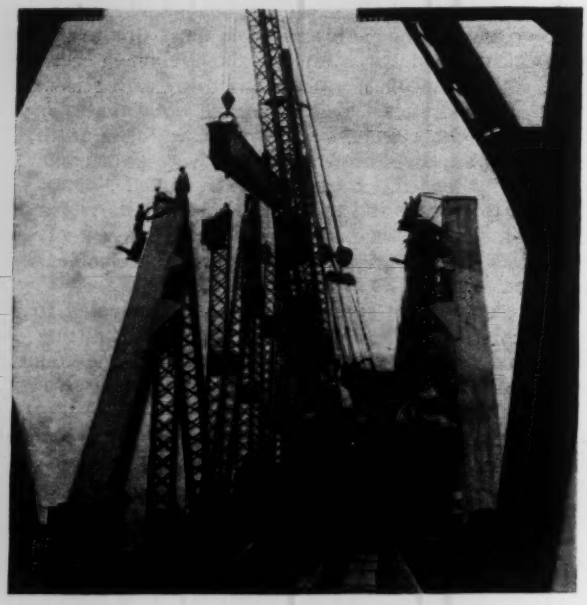
Landing erection span on temporary bent

Deck truss that fitted between main piers was moved by barges.

Lift-Span Operation—The span is raised or lowered by means of sixteen $1\frac{1}{8}$-in. plow-steel operating ropes; eight ropes are used for uphaul and eight for downhaul. These ropes are attached to take-up devices consisting of long threaded eyebolts that are connected to

the tower columns, the uphaul near the top and the downhaul near the bottom of towers.

The operating ropes hang vertically along the tower columns, passing over deflector sheaves at the span ends to a horizontal direction and wind around the four 54-in. diameter operating drums located outside the machinery house, two downhaul and two uphaul ropes on each drum. To each drum is bolted a spur gear meshing with spur pinions on the main transverse shaft, which passes into and through the house, and a spur gear keyed on this shaft meshes with the two pinions located on the



Placing top-chord sections

Main 526-ft. through trusses are 80 ft. deep at center and 33 ft. c. to c.

shaft extensions of the main motors. If for any reason the electric motors become inoperative, a jaw clutch may be engaged to shift control to a 200-hp. six-cylinder gasoline engine installed for auxiliary power and geared to the main operating shaft.

Each of the two motors is a 150-hp. 2,300-volt three-phase 60-cycle unit with full-load speed of 575 r.p.m., coupled to the driven machinery by means of a flexible shaft coupling. On the other end of the rotor shaft is mounted a solenoid brake of the spring-set magnet-released type equipped with an air cylinder for releasing the brake by compressed air. A third solenoid brake with identical equipment is mounted on the operating shaft independent of the motors.

Railroad-signal and electric-power cables are brought from the south tower, supported along steel cables hitched to a steel rocker bent at midspan, and down the rocker bent to the machinery house. An auxiliary counterweight weighing 37½ tons attached to the steel cables at the north tower holds the rocker bent upright and, in addition, tends to overcome the unbalancing effect of the weight of the 64 main counterweight ropes in various positions of lift.

To retard descent of the span at final seating, two air buffers have been placed on each end floor beam. They consist of a piston with protruding shank working vertically in a cylinder closed at the top and fitted with an adjustable needle valve to regulate air exhaust. When the span lifts, the piston drops by its own weight to the low end of the cylinder with shank protruding, and as the span approaches the pier in descending the shank strikes on a bearing plate on the pier with cushioning effect.

Accurate transverse alignment of the closed span is insured during the last 18 in. of its descent by means of centering castings with tapered jaws, which fit a wedge-shaped tongue mounted on steel struts between the main bearing castings. The span is precisely centered longitudinally at the fixed end bearings by tapered jaws that seat on a half-round bearing surface cast integral with the main-pier bearings. At the expansion end each end pin carries a single segmental rocker of 36-in. radius, which bears on the main-pier castings.

The span locks consist of a horizontal bar driven from the plunger of a 10-in. diameter cylinder by compressed air. The air is controlled by electro-pneumatic valves located within the lock-bar housing and operated by electric push button in the control room. This control assembly includes a latch that holds the lock bar in the drawn or driven position.

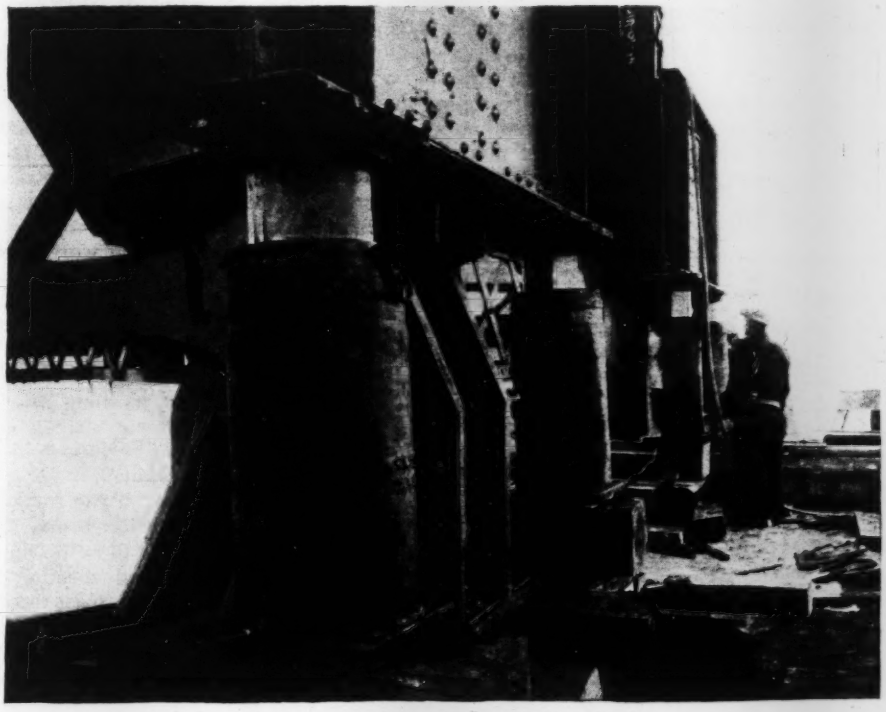
For operating the bridge locks, air-compressor units were installed in duplicate in the machinery room. One unit is directly connected to a 5-hp. electric motor and fitted with automatic pressure regulator and unloading

Driving pins in bottom chord

Heat-treated eyebars pretested to full load form the bottom chord.

cylinders for starting. The other unit is connected to the 200-hp. gas engine. Air is accumulated in two storage tanks with common discharge pipe, and 1-in. supply lines connect with the cylinders for the bridge lock and those for driving the rail-lock mechanism.

To secure continuity of the running tracks, the rails on the lift span extend across the gap between the lift and the fixed spans and are tapered to form slip joints in the track at the expansion end of the lift span. Each protruding rail on the expansion end of the lift span



Four 500-ton jacks ready for final lowering
Jacks were used to lift main spans for removal of erecting deck span.

carries a conical spud cast on the rail base, which fits into a circular hole in the rail-supporting chair casting on the fixed span. This spud provides a constant clearance gap between the rail ends of the lift span and the rail ends on fixed span; and all longitudinal movement of track, due to temperature changes in the length of the lift span, takes place in the slip joints.

The ends of the running rails on the lift span, which extend across to the fixed span, are locked down to the supporting rail chairs by means of a rail lock located on the end tie of the fixed spans. The rail locks are set and released by a system of links and levers, which are driven by compressed air controlled from the operator's house on the lift span.

Storage tanks for water, gasoline and compressed air are located outside of and above the machinery room. A jib crane for handling material from track level and a traveling crane of 4-ton capacity in the machinery room are provided.

Safety Provisions—A complete set of navigation signals has been installed, consisting of colored lights on spans and piers, in addition to audible signals for use during foggy weather. Also, a revolving airway beacon of 600,000 cp. has been placed above the top of the south lift-span tower, and flashing airway lights are set on the top of the north tower and each of the fixed spans. To insure against failure of these signals, an electric generator operated by a small gas engine has been provided.

The control room commands a view of the channel and the tracks at the end of the lift span. Operation of the span is controlled by a railway signal machine in the control room interlocked with the controls that raise the span. The main shaft is geared to the limit switch to cut off automatically either the electric motors or gas engine during raising or lowering, at the proper stage to prevent overhaul on the operating cables. The position of the bridge, vertically, is shown to the operator on indicator boards, one in the machinery room and one in the control room.

The railway signal machine is so arranged that in operating the span the following sequence must be used: (1) set all necessary track signals; (2) release the rail locks; (3) release the span locks; (4) set a selector that will determine whether the span is to be operated by the electric motors or by the gas engine; (5) release the lock on the controller or the engine, as determined by the selector; (6) raise the span.

The signal machine performs all these operations except the actual raising of the span. In lowering, the sequence is reversed. To maintain this sequence the interlocking is arranged as follows:

1. Track signals can be set clear only when all locks for the rail joints are engaged.

2. Rail-joint locks can be operated only when all necessary track signals are set against trains and both end locks of the span are engaged.

3. Span locks can be operated only when all locks for the rail joints are disengaged and the span is seated at all four corners.

4. Neither the lock on the controller nor the lock on the gasoline engine can be operated except when the selector is set for that particular lock and both the controller and the reversing lever for the engine are set at the neutral position.

5. Either the controller or the reversing lever on the gas engine can be unlocked, but both cannot be unlocked at the same time; the span can be operated either by electric motor or by the engine, according to the setting of the locks.

PRINCIPAL DATA ON SUPERSTRUCTURE

Item	Description	Span Length, Ft.	Distance From South Abutment, Ft.	Weight, Tons	Types of Steel — Per Cent of Weight — Silicon	Heat Treated	Structural
1	Viaduct approach (plate girder)	40 (four) 80 (five)	560	826	56	..	44
2	1 deck Warren truss (40 ft. deep 19.5 ft. c. to c.)	264	826	655	65	11	24
3	1 through Warren truss (curved top chord, 80 ft. deep at center, 33 ft. c. to c.)	526	1,356	1,912	59	14	27
4	1 through Warren truss (lift)	328	1,692	1,225	61	..	39
5	Lift-span towers	...	.....	940	9	..	91
6	Counterweight boxes	...	...	155	8	..	92
7	Main sheaves and bearings	...	...	170	..	..	..
8	Wire rope and connections	...	...	999	..	..	..
9	Operating machinery and guides	...	.....	89	..	..	..
10	6 through Warren trusses (same as item 3)	526	4,877	11,472	59	14	27
11	1 deck Warren truss (60 ft. deep, 33 ft. c. to c.)	504	5,383	2,007	54	18	28
12	Viaduct approach (plate girder)	40 (three) 100 (one)	5,603	298	49	..	51

6. The air release for the span brakes is so interlocked that power cannot be turned on the span motors when the brakes are released by air.

The entire bridge project was constructed under the direct supervision of C. R. Harding, assistant to the president, and W. H. Kirkbride, engineer, maintenance-of-way, assisted by G. W. Rear, engineer of bridges. All field work was in charge of H. I. Benjamin, assistant engineer of bridges, and matters of design were in charge of the writer.

The United States Steel Products Co. furnished the steel, and the American Bridge Co. erected the superstructure.

Mill and shop inspection of all the material used in the superstructure was made by Robert W. Hunt Co., and, in addition to usual tests, the heat-treated eyebars received a special inspection. This included inspection of the material, the heat treatment and, to give positive assurance of the superior stress-carrying properties imparted by this heat treatment, *every* eyebar was proof-tested to full-load capacity. These bars showing no permanent set, after being pulled, were then bored to exact length required.

Collapse of German Arch Bridge Traced to Tremie Concrete in Piers

FOUR YEARS AGO a concrete arch bridge over the river Oder at Gartz, Germany, collapsed a week before it was to be opened for traffic, and three workmen were killed. Judicial investigation and subsequent criminal trial of four members of the contractor's organization have just led to their acquittal. The trial brought out that weakness of the lower parts of the piers, which were concreted under water by tremie, was responsible for the collapse. The case was reported in *Der Bauingenieur* in December, 1930.

Three concrete spans of tied-arch type, 124, 191 and 124 ft. long, formed the bridge. At the two pier sites the water was about 20 ft. deep, and the bottom consisted of a layer of sand and mud, then about 10 ft. of gravel, and tight marl strata below. The contractor, who had also designed the bridge, built the piers by inclosing the site of each with interlocking steel sheeting driven down into the marl after the bottom had been dredged to footing level. Pier forms extending down to the river bottom were then suspended in this inclosure, and concrete was placed by tremie.

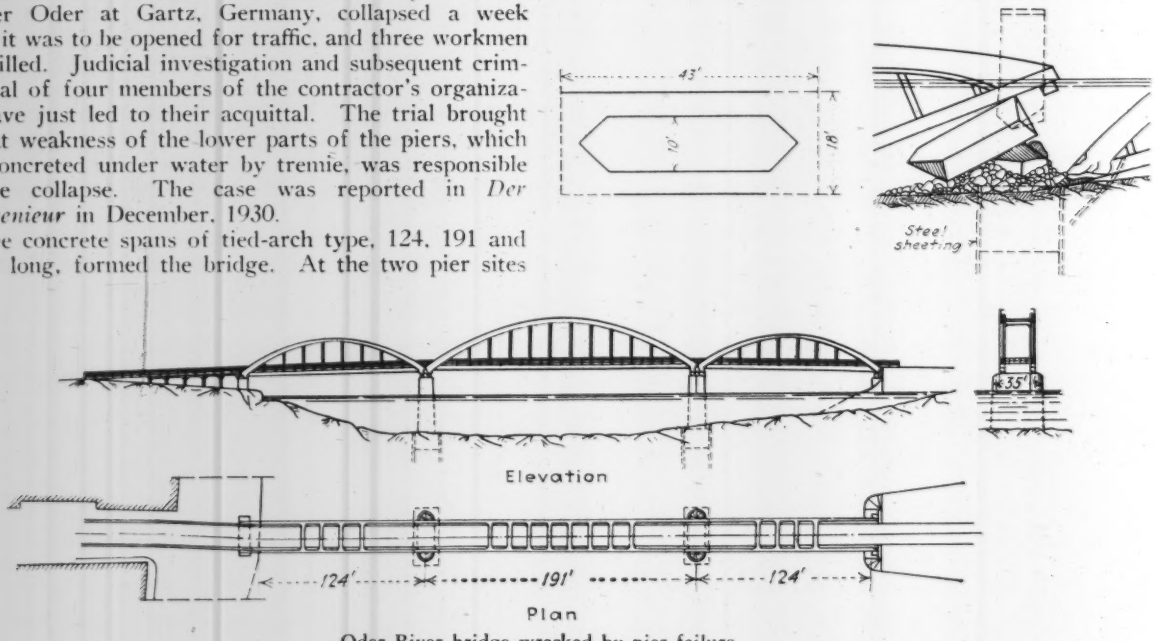
The form planks were spaced ¼ in. apart to allow for swelling of the wood. During the work of concreting the first or left-hand pier it was found that concrete flowed out through the form joints into the space between form and cofferdam wall, and work was stopped when the top of the concrete was a short distance above the river bottom. The cofferdam was pumped out, and a large amount of concrete material was found in the cofferdam outside the form. Later, apparently, the rest of the pier was concreted in the dry. The right-hand pier, the one which later failed, was concreted through water all the way up to river surface. The work was done with a tremie pipe that was shifted progressively over the whole area of the pier. Concrete was charged into the tremie in 10-cu.ft. batches. The tremie is stated to have lost its charge at least occasionally.

After the entire superstructure was completed the right-hand pier collapsed by shearing or crushing below water level and dropped the two adjoining spans. A section of this pier, about 10 ft. high and beginning just above river bottom, was crushed into fragments.

Subsequent examination of the concrete of the surviving pier showed extensive segregation, very low resistance at many points (this lack of strength being more marked in the lower parts), and between pier and sheeting a deposit of about 45 cu.yd. of a weak, light mass (evidently hardened laitance). The fragments of the failed pier indicated that it was similar to the other.

At the trial there was much expert testimony on chemical action of river and groundwater, and on the effect of wave wash from passing vessels to cause the cofferdam to breathe, thereby induce a washing-out or leaching action on the pier concrete. However, the facts point clearly to segregation due to defective underwater concreting method as the responsible cause.

Indictments were found against the contractor's manager, engineer and two foremen. They were acquitted, the court holding that, while the method adopted was not in accord with recognized good practice, approval of the method by representatives of the city had relieved the contractor of responsibility.



Oder River bridge wrecked by pier failure

Buenos Aires Subway 4.6 Miles Long Built in Twenty Months

First section of Lacroze line now in operation — Second section under construction—Part of route in tunnel—"Tosca" banks stand vertical in open-cut work

AMERICAN ENGINEERS and constructors in Buenos Aires established a speed record in subway construction in building the first section of the double-track Lacroze line, 4.6 miles long, in twenty months. The engineers, Dwight P. Robinson & Company of Argentina, Inc., a division of United Engineers & Constructors, Inc., investigated the local conditions controlling the construction of the Lacroze project, estimated the financing required, designed the subway structure, built the line, purchased the rolling stock and equipment and organized the operating force. American bankers, Harris, Forbes & Company, financed the project. Construction started in December, 1928, on the first section, 7 km. long; and by September 1, 1930, twenty months later, this section was ready and the operation of test trains was begun. Train service for the public commenced Oct. 18.

The Lacroze subway extends from the present terminal of the Ferrocarril Central of Buenos Aires at Chacarita southeastward under Triunvirato and Corrientes streets to Florida St., a total length of 8.7 kilometers. The first section, now in operation, extends from the Central of Buenos Aires terminal, known as Federico Lacroze station, to Callao St. The second section, from Callao to Florida, is now under construction, scheduled for completion in 1931. Eventually the line will be extended to the riverfront, with connections to the various docks in the port of Buenos Aires. About half of the completed section was built in open cut, the remainder of that section was built in tunnel, and all of the second section is being built in the same manner.

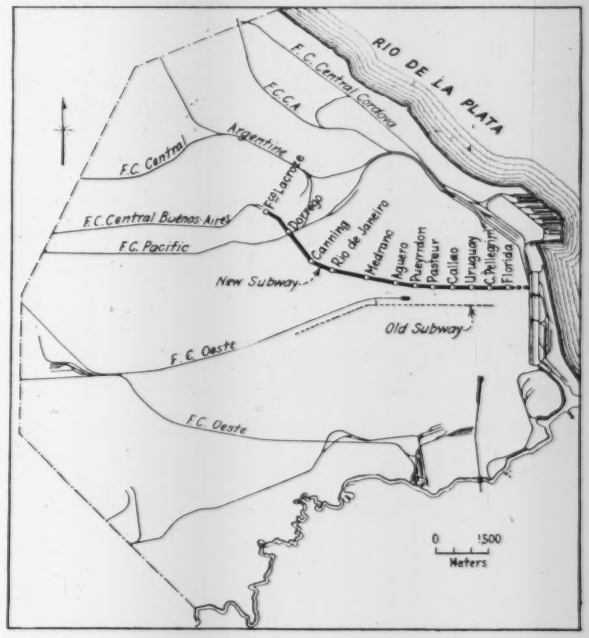


Fig. 1—Map of Buenos Aires, showing line of new Lacroze subway

The new subway, built under a concession granted in 1913, is more than a rapid-transit line. It will provide access to the heart of the city for the passenger trains of the Central of Buenos Aires Railway and its connections, the Entre Ríos, Central of Paraguay and Northeastern Argentine. These roads, aggregating over 3,000 km. in length, serve a most productive region of Argentina and Paraguay. Passenger trains of these roads now using terminals at Chacarita will eventually be brought

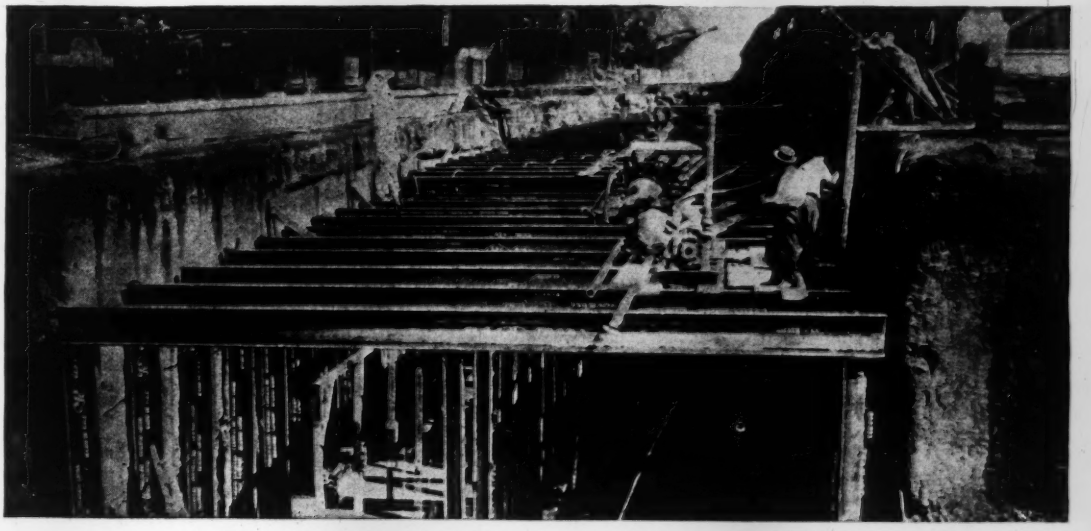


Fig. 2—Typical section of open-cut construction, Lacroze subway

through the subway by electric locomotives to Carlos Pellegrini St., approximately in the center of the business district, where a four-track underground station is being built. Two tracks of the station are for subway service and the other two for through-train service. The subway will also serve as a feeder to the various Lacroze tramway lines that cover the entire northeastern part of the city. Federico Lacroze started this transportation system 50 years ago with a horse-car tramway line.

Design

The open-cut portion of the line is of standard double-track, steel-bent, box construction, three columns per bent, with reinforced-concrete jack arches in the roof and outside walls. The steel bents, spaced 6 ft. on centers, rest on three rows of continuous concrete footings with concrete cross-struts placed every third bent. The tunnels are two single-track arch sections lined with reinforced concrete, with a common center wall between tracks. In dry ground the invert is not paved, and the subway walls rest on three longitudinal spread footings with concrete cross-struts spaced 18 ft. on centers. In wet ground a reinforced-concrete invert slab is used. Dimensions of the box and tunnel sections are shown in Figs. 3, 4 and 7.

There are twelve stations on the entire line. The intermediate stations are normally 132 m. in length, with side platforms. These are designed for eight-car subway trains. The Federico Lacroze station is 217 m. long to accommodate trains of the F.C.C.B.A. and its connecting railways. The Carlos Pellegrini station, being a combined railway and subway station, will have two tracks exclusively for trains of the Central of Buenos Aires, with corresponding long platforms. Stations built in open cut have no mezzanine floors, and the platforms are reached by stairs direct from the sidewalk. Stations with

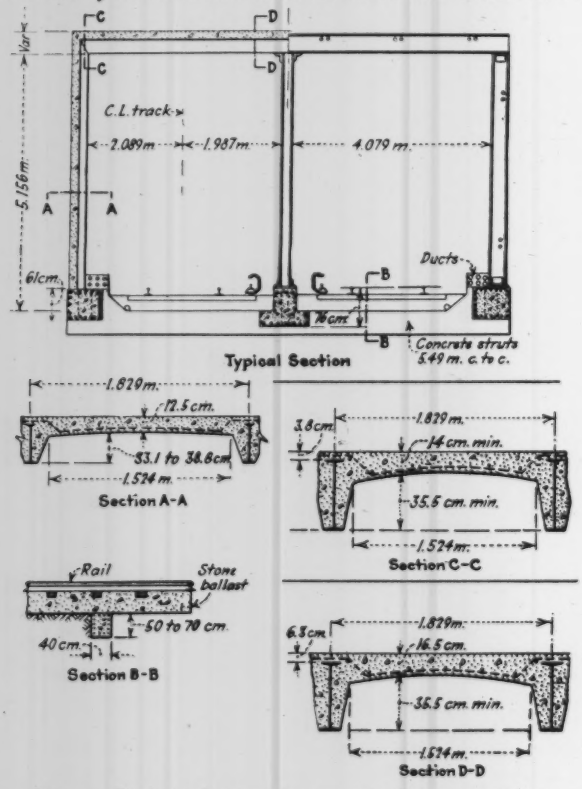


Fig. 3—Design of open-cut structure between stations

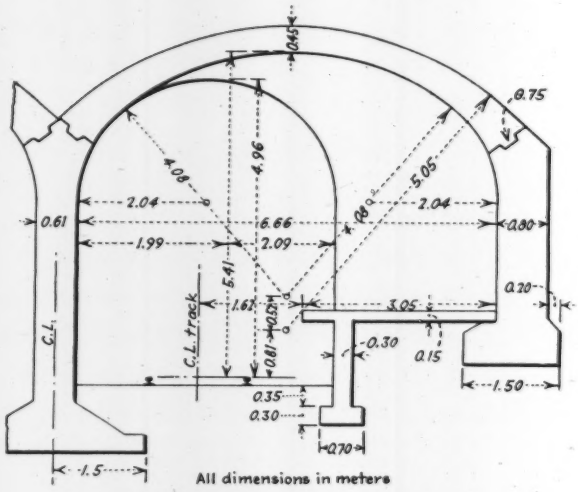


Fig. 4—Design of station in tunnel

platforms more than 8 m. below street level contain a mezzanine floor immediately beneath the street, and, in compliance with national and municipal regulations, escalators extend from mezzanines down to the platforms. Each platform has two escalators, operating ascending or descending as required, and also a stairway leading to the mezzanine. Incidentally, these escalators were the first to be installed in South America.

Special attention was given to producing cheerful attractive stations (Fig. 5). Walls and floors were tiled with different colors to distinguish the different stations. Brilliant lighting was provided. All stations have been equipped with turnstiles to speed up traffic.

The running track is 1.435-m. gage (U. S. standard) and consists of 49.6 kg. per meter rail (100 lb. per yard), held by screw-spikes to quebracho (native wood) ties. Eight double crossovers have been provided to allow for flexible operation. A turnout has been built from the subway to the basement of a vegetable and fruit market, which will be used for freight purposes only. Near the Lacroze station is an unusual feature, an underground car-storage yard and repair shop large enough to accommodate 110 cars. The construction is of steel and concrete jack-arches in type similar to the typical subway construction in open cut.

Construction

Open-Cut Work—Conditions on the open-cut sections were ideal for subway construction. The streets average 26 m. wide between building lines; and as the double-track subway structure is but 9.5 m. wide, there was not only little interference from buildings but also there was room to bypass tramway lines without the necessity of decking over the subway cut. Street traffic was diverted to adjacent streets, which did not prove to be a severe inconvenience, as the street was restored for use in about six weeks. Tramways, gas pipes, water lines, electric and telephone cables were temporarily supported in the trench during construction, and temporary bridges were constructed at street intersections to take care of cross-street traffic. Sewer lines were reconstructed outside the trench location before excavation. Very little groundwater was encountered throughout the work.

The soil encountered in the greater part of the construction in open cut and in all the tunnel work is locally known as *tosca*. It appears to be a fine clay with an

Fig. 5—View of one of completed stations in tunnel

admixture of very fine sand. Undisturbed soil possesses an unusual degree of cohesion, so that walls of an excavation will stand vertically or even slightly overhanging (Fig. 2). Tunnel arches under small live load seldom required support, although the walls and arches were often lightly shored and timbered, so that workmen may have warning in case of a slip or break. In the case of the longer-span arches at station platforms with heavy traffic on the street above, the arches were completely lagged with 3 in. lumber. The unconcern with which native laborers, truck drivers and other traffic worked close up to the edge of unshored vertical banks was a surprise to construction men not acquainted with the remarkable stability of the local soil. The *tosca* is almost impervious and withstands heavy rains without washing. There is a tendency for it to slack and ravel when first exposed to the air, but some steam-shovel cuts plainly show the teeth marks of the shovel after twenty years' exposure. Only a limited amount of bracing or shoring was required, even in the open-cut work. The sides of the trench were trimmed smooth in vertical planes and were so accurately trimmed to line that no back forms were necessary.

Excavating was done using both steam shovels in the cut and crawled cranes with clamshells on top. Steel and concrete work followed excavation closely; consequently the bulk of the excavated material was loaded into trucks at street level by the clamshell cranes and stored to be used as backfill. The rest was hauled away to be used as fill on city property.

The steel, all light sections, was erected by the use of crawler and truck cranes and also by a traveler that spanned the trench. Most of the concrete was mixed at a central mixing plant and hauled to the forms by standard dump trucks hauling 3 to 4 cu.yd. In a few congested zones where traffic delays to the concrete trucks were likely to impair the quality of concrete, small portable mixers were used. An industrial railway using ½-yd. cars on narrow-gage tracks distributed concrete to the forms. The central mixing plant proved highly successful despite some inconvenience arising from the local custom of arresting both drivers and impounding both vehicles in case of a traffic accident.

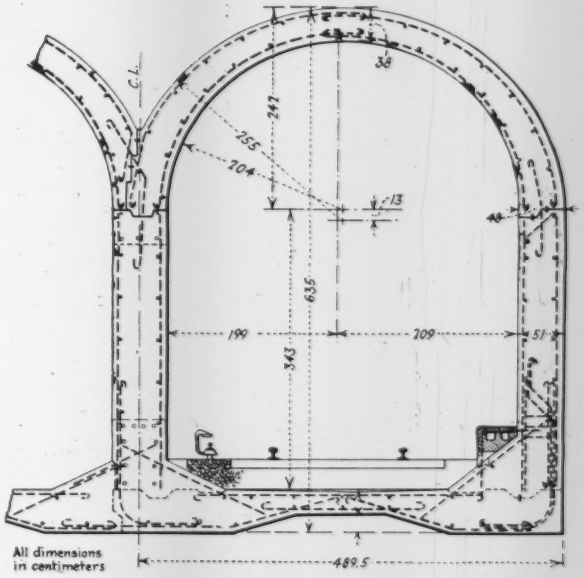


Fig. 7—Design of tunnel section between stations

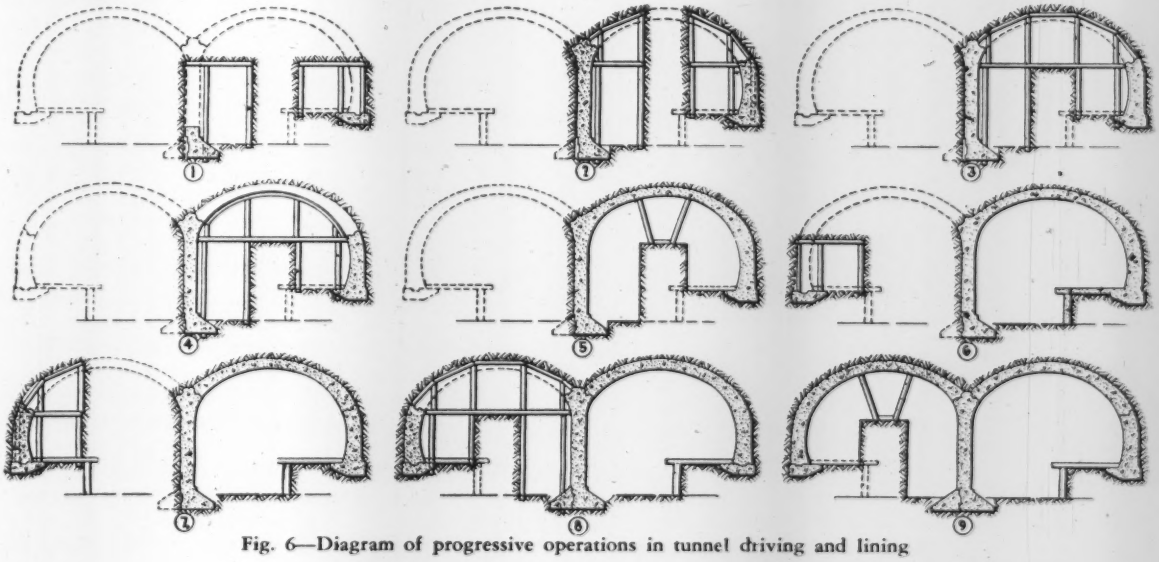


Fig. 6—Diagram of progressive operations in tunnel driving and lining

Fig. 8—Tunnel-arch forms in station area

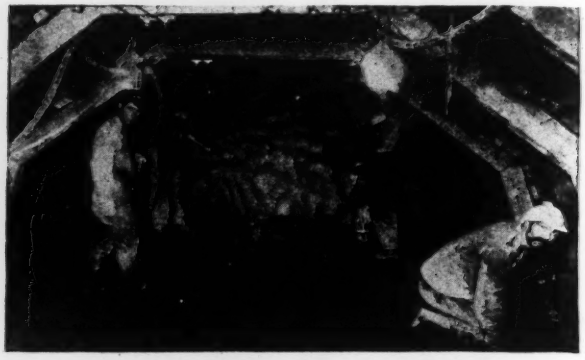


Fig. 9—Excavating tunnel with clay spades

Steel forms were used for the jack-arches in both walls and roof. Owing to conditions a new type of form was designed for this job and was adopted after careful tests. The forms proved very satisfactory in use. They were handled by travelers similar to those used on New York subway construction. In general, all construction equipment was gasoline-engine driven because of simplicity and the availability of qualified mechanics. Silencers were used on engines driving compressors.

Tunnel Construction—Wherever the depth of cover over the structure exceeded 4 m., tunnel construction was resorted to, as the hard, dry and compact nature of the *tosca* encountered proved very favorable to this type of construction. Two isolated sections of tunnel were built from one shaft on each, one 400 m. long beneath the Arroyo Maldonado and the other 525 m. between Lambare and Gazcon streets. From Salguero St. eastward all of the completed subway section, as well as that under construction, is in tunnel. Between Lambare and Callao eight shafts were sunk, three being at station sites. Four additional shafts will be needed to complete the tunnel to Florida. All shafts are provided with two compartments except the one at Parana, which has but one. From each shaft headings were driven in both directions for both tracks.

The double-track tunnel section consists of twin arches with a common center wall. In driving the tunnel one arch was driven ahead of the other, starting with side drifts for the outside and center walls. A crown heading was then driven connecting to side drifts and leaving a center section of undisturbed material to support the arch timbering. The *tosca*, while stiff enough to require only light timbering, digs easily with pneumatic spades.

Side walls and arch of the first section of the tunnel were concreted before the other half of the tunnel was started and before the center section of the first had been removed. The diagram in Fig. 6 shows the steps in tunnel excavation at one of the stations, and this general procedure was used in the sections between stations. All tunnel-arch concrete was placed by pneumatic machines. The tunnel-arch forms consisted of longitudinal 2x8-in. lagging carried by angle-iron ribs that were in turn supported by posts resting on the unexcavated core. The concrete arch for 6 ft. of single-track tunnel was normally placed at one time. At points where there was a question whether 6 ft. of roof would safely stand unsupported the length was reduced to suit the conditions.

After the first arch had been completed for some distance work was started on the second arch. A side drift was driven on the line of the outside wall, and the arch heading was excavated, leaving a solid section in the center unexcavated to take the thrust of the first arch until the second arch was completed. Concreting followed close to excavation work on both arches. The same procedure was used in building the stations in tunnel.

At frequent intervals small shafts were cut through to the street surface to provide chutes for the handling of concrete from trucks into the tunnel and for ventilation.

Equipment and Operation—The rolling stock consists of all-steel passenger cars of modern design. The seating capacity per car is 47, with a total comfortable capacity of 150. In the rush hours four-car trains, operating under a 2½-min. headway, complete the trip from Federico Lacroze to Callao St. in 14 min. When service is extended to Florida operation will be increased to five-car trains on a 2-min. headway, making the one-way trip in 18 min. The steam trains now terminating at Federico Lacroze station will be hauled by electric locomotives to the terminus at Carlos Pellegrini when it is completed. Power is supplied from a central station, where two generators of 7,000 kw. each are installed, and is distributed to three substations at 13,500 volts This supply is augmented by a connection to the system of the local power company, Compañía Hispano-Americana de Electricidad, for the supply of such additional power as may be required. The substations convert the current to 575 volts.

GENERAL QUANTITIES—LACROZE SUBWAY

Length of subway, both sections, meters	8,741
Open cut, m.	3,133
Tunnel, m.	5,608
Maximum grade at entrance, per cent	3.75
Maximum grade elsewhere, per cent	3
Sharpest curve, m. radius	250
Total excavation, cu. m.	750,000
Total structural steel, metric tons	7,000
Total reinforcing steel, metric tons	6,000
Total concrete, cu. m.	130,000

Organization and Personnel—A division of United Engineers & Constructors, Inc., Dwight P. Robinson & Company of Argentina, Inc., designed and built the subway. The work was under the direction of Ira W. McConnell, vice-president, with J. L. Lytel, manager, and W. W. Taylor, general construction superintendent. The owner, the Ferrocarril Terminal Central de Buenos Aires, was represented by Dr. Teofilo Lacroze, president, and Dr. Luis J. Rocca. A maximum of 3,000 employees was used on the first section, the personnel being made up of 32 nationalities. Much of the construction material used on the subway was imported. Sand and crushed stone for concrete aggregates were shipped in from Uruguay. Cement was brought from England, because, being duty free under the concession, it was 25 per cent cheaper than Argentina cement. Lumber, structural steel and construction machinery came from the United States.

Flooding of Sewage-Works Prevented by High Freeboard

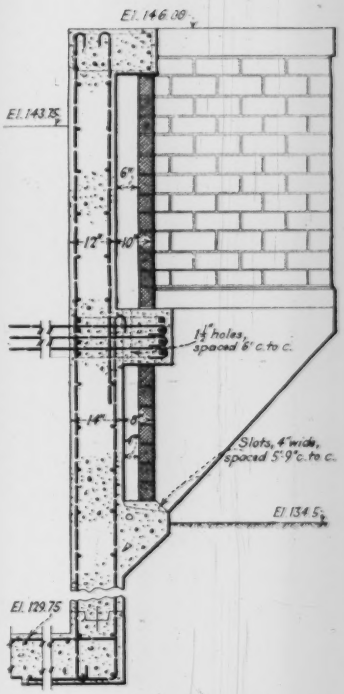
Ottawa, Kan., plant has sewage flow line 10 ft. above ground — Exposed walls faced with hollow tile

By F. M. VEATCH
Black and Veatch, Consulting Engineers, Kansas City, Mo.

THE PROSPECT of frequent flooding of the site of the sewage-works of Ottawa, Kan., recently completed, necessitated a design which would keep the flow-line of the sewage through the plant above the expected high-water level. To accomplish this end the various plant units and buildings were constructed with a freeboard of 10 ft. above the ground, with side walls protected by a facing of hollow tile. Only partial treatment will be necessary when the Marais des Cygnes River, into which the plant effluent discharges, is at high stage.

The flow in the river varies from practically nothing to a maximum in excess of 20,000 sec.-ft. For approximately 45 per cent of the time the flow is less than 50 sec.-ft. The river stage varies from 0 to 40 ft., and the ground at the plant site is subject to frequent flooding, occassionally to a depth of 10 ft. The plant units were therefore so constructed that the level of the water contained in the different tanks and chambers is about 10 ft. above the level of the ground. The exposed walls of the several units, necessitated by this elevation, have a facing of hollow tile separated from the face of the concrete by a 4-in. air space. This acts as a protection against the freezing of the concrete and results in a more attractive appearance. Elevated walkways provide access from one plant unit to another.

Because of the great amount of infiltration into the domestic sewers, the flow reaching the works is increased during periods of wet weather from approximately 60 gal. per capita in dry weather to 130 gal. per capita. Because periods of high sewage flow and high streamflow are, in general, coincident, it is planned to give complete treatment to only 1.2 million gallons per day. Whenever the flow exceeds this amount the excess will be given preliminary treatment by settling only. At flood time the river carries so much polluting material from the region above Ottawa that the additional polution caused by discontinuing operation of the treatment plant will be of no consequence, and for this reason the entire sewage output will be bypassed to the stream.



Cross-sections through wall of the aeration tank, showing facing to protect the concrete from frost

Sludge beds and other customary features, which could not well be protected from flood heights of 8 ft. or more, have been eliminated from the plant entirely. Digested sludge will be discharged on to a gently sloping area along the river bank for drying, and all that is not sold for fertilizer will be washed down the river during floods.

In addition to the domestic sewage of the city, this plant will handle the collection from some 400 privies located in territory not now served by sewers. This material will be delivered to the plant in trucks during the night and will be dumped on a screen having 1-in. openings and located over a small pit. The collections will be forced through the screen by means of a water jet and then discharged by gravity into the raw-sewage pump pits.

New sewage-works at Ottawa, Kan., designed to be safe from flooding by Marais des Cygnes River

Data on New Ottawa, Kan., Activated-Sludge Plant

Population served, 12,000. Units include settling tanks for preliminary treatment, aeration tanks and clarification tanks for final treatment and gas-heated digestion tanks for sludge treatment. Preliminary settling tanks, 30 ft. in diameter by 10 ft. deep, with continuous sludge removal. Retention period, 1.25 hours at a normal rate of 1.2 m.g.d. Outward flow from a 16-in. inlet pipe to two steel collecting troughs.

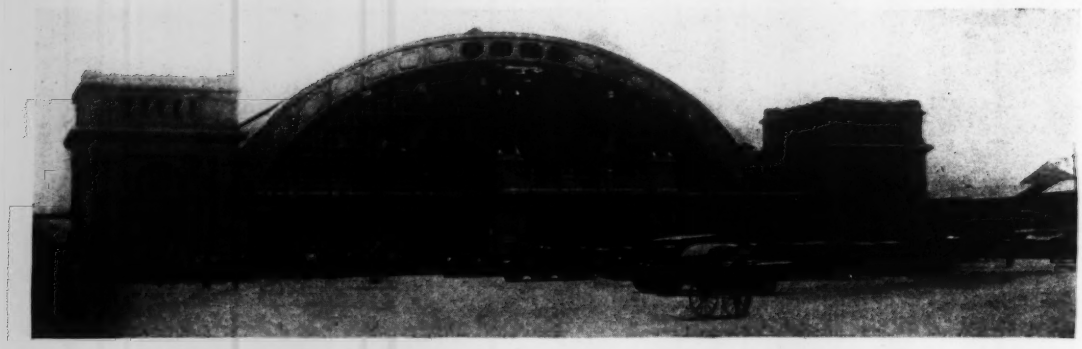
Aeration tanks, four units of spiral-flow type, each unit 14 ft. square by 66 ft. long. Aeration period, 1.87 hours for the settled sewage plus 20 per cent activated sludge for each unit in service. Aeration period for all four units, 7.5 hours. Diffuser-plate area, 104 sq.ft. Air to be applied at 2 cu.ft. per minute per square foot of plate area.

Final settling tanks, 40 ft. square by 10 ft. deep. Detention period, approximately 2 hours. Continuous sludge removal.

Sludge-digestion tank will treat raw sludge from preliminary settling tanks and excess activated sludge. Circular concrete tank, 35 ft. in diameter by 20 ft. deep, with continuous sludge removal. Gas generated will be collected and burned in hot-water boilers to control temperature of tank. Tank capacity, 1.6 cu.ft. per capita.

Sewage pumps, blowers, sludge pumps, gas boilers and other equipment are housed in centrally located building.

Cost of construction, approximately $100,000. Contractor, W. B. Carter, Sioux City, Iowa. Consulting engineer, Black & Veatch, Kansas City, Mo.



Railway terminal station, Bangkok, Royal Siamese Railway

Civil Engineering in Siam

By HAROLD E. BABBITT
Professor of Sanitary Engineering, University of Illinois, Urbana, Ill.

SIAM, an absolute monarchy with a population of about 10,000,000 and an area of 200,295 square miles, is enjoying an awakening to the advantages of public works which is keeping her well in the van of progress in the Orient. The first step was taken in 1891 with the commencement of the construction of railroads, followed much later by the commencement of construction of highways to feed the railroads. Construction of modern irrigation works was begun in 1917, and a plan has been adopted which calls for extension of these works as the country develops. Foreign engineers of experience are employed in an advisory capacity in all the public-works departments, and in the capital city of Bangkok the city engineer and water-works engineer are Frenchmen. The principal public utility lacking in Bangkok and Siam is sanitary drainage to remove sewage and to combat mosquitoes. The largest construction job in progress when this was written (1930) was the erection of a bridge at Bangkok to commemorate the 150th anniversary of the present royal dynasty.

Railroads—The Royal State Railways of Siam are the pride and special interest of the government. More than $90,000,000 has been invested in the railways, with the result that the roadbed is excellent and fine trains with comfortable equipment are operated with regularity. Railroad construction was begun in 1891, but slow progress was made during the next ten years and only 75 miles of road were in operation in 1900. The end of the second decade of development showed 577 miles open in 1910. In 1918 there were 1,305 miles, and in 1930 there were 1,794 miles in operation. The first international through express from Bangkok to Penang was put into service in 1922 and the Rama VI bridge, across the Menam Chao Phya, joining the northern and southern parts of the system, was opened to traffic on Jan. 1, 1927. There is now rail connection from Bangkok to Singapore, the full length of the Malay peninsula, a distance of about 1,300 miles. The line from Bangkok to the Indo-Chinese frontier at Aranya Pradesa was completed in 1926; this will soon be joined by the line under construction in Indo-China to reach the west bank of the Mekong River at Phnom Penh, the capital of Cambodia. A connection with the lines in Burma will be made from Prachuab Kirikan. The whole system is operated as a single-track line except for the portion from Bangkok to Bangsue, a distance of 5 miles. This double track is being extended to Klong Rangsit, about 17 miles from Bangkok, and will ultimately be carried to Ban Phaji junction, 60 miles from Bangkok.

Progress is still being made with the opening of about 150 miles of new lines annually, the total length of new lines approved for construction being about 350 miles. Of this length 120 miles were under construction last year and the remainder were being surveyed. At the start of construction the gage adopted was 4 ft. 8½ in., and about 500 miles of this gage were laid, one line extending from Bangkok to the present northern terminus at Chiengmai and the other to Korat, on the northeastern line. About 50 miles of this gage was laid on the western side of the Manam Chao Phya before it was decided to change to a gage of 1 meter to accord with the gage adopted in the neighboring countries of Burma, Indo-China and the Federated Malay States. The gage conversion is so far completed that all trains are now running on meter gage, but some of the standard-gage track is still in place.

The permanent way is laid with 50-lb. rail fastened to hardwood ties with dog spikes. Relaying of about 211 miles, including the double-track section, with 70-lb. rail is contemplated. Excellent traprock ballast is laid to a depth of 6 in. under the ties on all lines.

The most expensive structure on the line is the Rama VI bridge, erected by Les Etablissements Daydé, of Paris. This bridge is of the cantilever type with a lenght of 1,450 ft. between abutments. It is divided into five spans as follows: central span, 394 ft.; two spans on either side, each 275½ ft., and two end spans, each 252½ ft. Between centers of main girders the bridge is 32 ft. 10 in. wide. It is designed for a single-track railway, a 16-ft. highway and 5-ft. sidewalks outside the main girders. Clearance under the bridge is 32 ft. 10 in. above mean sea level and 26 ft. 3 in. above maximum flood level.

Highways—The highways of Siam are of minor importance as a means of communication. There is no highway for vehicular traffic within 30 miles of Bangkok

and no plans for the construction of one. It has been found more advisable to construct disconnected highways from the railroad than to plan a national highway system that might duplicate some of the railroad services. No cross-country highways exist or are contemplated, construction being concentrated on short routes, the greatest length of which does not exceed 100 miles.

Construction of highways by the state was begun in 1918. Since that time 771 miles of road have been completed. In addition to the state highways about 60 miles of provincial highways have been completed and 550 miles are under construction. Both state and provincial highways may be constructed and maintained by the state, but some local financial assistance is given for a provincial highway. There is no sharp line of distinction between the two classes of roads.

The type of road being built is principally for light traffic, the classifications being: first class, suitable for motor traffic; second class, suitable for horse-drawn and light motor traffic; third class, suitable for light traffic; and fourth class, cart track. All roads have so far been constructed to the same standards, with one or two exceptions, the classifications being used primarily for budget purposes in allotting maintenance funds. The smallest amount of money is allowed for the maintenance of third-class roads. It is customary to construct the highways 20 to 24 ft. wide, with a traveled way of 20 ft. through villages and towns and 13 ft. in the country. Practically all surfaced highways are finished with waterbound macadam. Asphalt has been used only during the past two years and there are about 50 miles of asphalted surface, mainly waterbound macadam with a surface painting of asphalt. In the construction of the macadam surface a layer of 4-in. to 6-in. stone is placed by hand upon the subgrade. This is covered with a layer of 2½-in. stone at the rate of about 650 cu.yd. per mile.

Street repair, Bangkok

In the construction of bridges, concrete beam-and-slab structures are used for spans up to 20 ft. Above this span, steel bridges are used. Only one concrete arch bridge is in use. It has a span of 100 ft. Bridges are designed to carry a 15-ton roller, and steel bridges and designed in accordance with American Bridge Co. standards.

Total expenditure for state and provincial highways has amounted to about $10,000,000. The budget for 1930 (actually for the year 2,472 Buddhist era, which began April 1, 1930, and ended March 31, 1931) was the largest ever allowed. It was for $2,250,000 and exceeded the previous year's budget by $250,000.

Irrigation—The commencement of modern irrigation in Siam was launched by the employment, in 1902, of J. Homan van der Heide, an irrigation engineer borrowed from the Dutch government to study, report on and make recommendations concerning the future irrigation policies of the country. Van der Heide submitted his report in January, 1903, but no action that resulted in constructive work was taken. Successive years of drought and crop failure forced action, and in 1913 the government employed Mr. Ward, now Sir Thomas Ward, and a staff of experts loaned by the government of British India. Sir Thomas Ward's work was thorough and exhaustive, and his report, which was voluminous, was issued in 1914.

Construction of works recommended by Ward was first commenced in 1917 on the Prasak South Canal project, which was carried to completion in 1923. Some work has been done on nearly all of the Ward recommendations since then, with but few variations from the original plan. The present construction program will be completed in 1933, money being spent as shown in the accompanying table. Since irrigation works have been in operation the yearly expenditures incurred by the maintenance and conservation branch have mounted steadily, reaching $500,000 in 1925, and the budget for 1930 was more than $1,000,000.

The total area of land within the working area of the royal irrigation department is about 4,000 square miles, practically all of which is located in the central plain of Siam. Within this area the method of irrigation consists in diverting water from the river into supply canals and inundating the land therefrom. Areas near the seacoast are inundated by the tides and rendered unfit for cultivation. In order to reclaim this land a dike is now being completed between the Nam Bang Bakong and the Menam Chao Phya rivers. This dike will be provided with tide gates that will prevent undesirable flooding at high tide and will permit the drainage of land at low tide. In periods of drought when water is too low to reach the fields from rivers and canals the royal irrigation department sends pumps to the affected districts. The equipment now consists of several 8-in. and 12-in. centrifugal pumps and five 24-in. centrifugal pumps, each with a capacity of 25 cu.ft. per second. Each of the larger pumps is able to provide water for about 70 acres of land per hour, or a total of 3 square miles.

Of the irrigation structures that have been completed the most important is the Rama VI barrage across the Nam Prasak, a tributary of the Menam Chao Phya. This structure is a concrete dam about 40 ft. high and 265 ft. long across the cutoff channel. The barrage is equipped with six stoney gates with a clear opening of 41 ft. and a lift of 24½ ft., designed to hold the full head of water. It was completed in 1922 at a cost of $1,296,333. The main canal leading from the barrage is 10 ft. deep and 20 miles long, and is 130 ft. wide at the upper end, the width being reduced progressively to 95 ft. It has a capacity of 3,500 sec.-ft. at the upper end. The total length of main canals in the project is 55 miles, and in their construction 13,500,000 cu.yd. of material was excavated.

Municipal Work in Bangkok—The work of the city engineer's office in Bangkok is divided between a public-works section and a waterworks section. The public-works section has four divisions—engineering, architecture, streets, and inspection and survey. The engineering and architectural sections are responsible for the design of bridges, culverts and drains. At present there are no bridges with spans greater than 50 ft. within the city,

all bridges being of a minor sort across navigation and drainage canals. However, the number of small bridges is relatively large, there being 210, about 58 of which will carry no more than an 8-ton roller and 89 are limited to a maximum load of 12.6 tons. Because of the flat topography of the city, street grades must be broken to carry the roadway over traffic in the canal. Design and construction of satisfactory approach grades are difficult and expensive and the results are seldom satisfactory to both navigation and vehicular traffic. Whenever possible, bridges spanning useless canals are transformed into culverts and their grade is cut down to the general street level. Reinforced-concrete bridges are most commonly used, designed to bear the load of a 12.6 ton axle. The total amount of money spent on bridge maintenance and repair during the year ended March 31, 1930, was $46,000, of which $30,000 was spent on the reconstruction of the Kashatriya Suk bridge, a reinforced-concrete structure with a 36-ft. main span.

Double-gage tracks and switches on Siamese railway

No comprehensive sewage system exists in the city. There are some sanitary sewers and stormwater drains, but generally dependence is placed upon night soil collection and burial or on septic tanks, with private sewers discharging into the many canals throughout the city. The lack of sewerage system and the presence of so much standing water is not conducive to sanitary conditions in the city, which is infested with mosquitoes. From the viewpoint of first cost, the construction of a comprehensive sewerage system is not considered advisable, first, because of the over-crowded nature of the buildings in the densely populated districts, which have made plumbing installations and sewer connections difficult; second, because the large distances between buildings in most of the residential areas make sewers expensive in proportion to the population served; and third, because of the difficulty of excavating in the soft muck on which the city is built. There is little use of expending large sums on a sewerage system until some comprehensive city plan has been adopted. Sewers and drains are now constructed where imperative needs demand, with their outlets in the most convenient canal. During the fiscal year 1930, 29,300 ft. of drains were constructed at a cost of $90,000.

The length of public streets in Bangkok is estimated at 115 miles. Two types of paving are used on these streets —macadam and asphalt. Concrete is not yet used because of its present high cost as compared with asphalt, which is satisfactory. The total area of concrete pavement is 1,600 sq.yds., which was laid in May, 1929, as an experiment. Macadam is generally of short life because of the poor road metal available; therefore every effort is made to pave with asphalt, and considerable experience has been had therewith. There were 223,340 sq.yd. of asphalt-paved surface on March 31, 1930, and asphaltic surfaces will be adopted for all new paving projects. In the construction and paving of streets, every opportunity is taken to reduce gradients, particularly at bridges approaches, to 3 per cent or less where possible.

Three types of asphalt paving are now laid; that of the first class, for heavy traffic, has a foundation course of 10-in. stone blocks, an intermediate course of 4-in. waterbound macadam or 3- to 4-in. asphalt macadam, mechanically mixed or grouted and a top course of asphaltic concrete or sheet asphalt; the second class, for medium traffic, has a foundation course of 6- to 8-in. waterbound macadam and a top course of asphaltic concrete or asphaltic macadam mechanically mixed or grouted; the third class, for light traffic, has a foundation course of 4-in. waterbound macadam and a top course of asphalt macadam, semi-grouted. The most serious objection to the use of asphalt has been the shortness of the laying season, which is about 130 working days, from December to May—that is, during the dry months. Where waterbound macadam foundations have been prepared previous to or during the rainy season the binder and some of the finer material may be washed out before the top coat can be laid. Asphaltic emulsions, reliable when laid in any season, have not yet been used in Bangkok.

Expansion of motor traffic has increased the demand for better pavement. To meet this demand an inexpensive type of resurfacing for lightly traveled streets has been attempted. Existing macadam is strengthened by the addition of stone to a minimum consolidated thickness of 6 in. and is left under traffic for about two months. An additional layer of fine stone is then laid to a thickness of $2\frac{5}{8}$ in. and asphalt grouted by hand at the rate of $1\frac{1}{3}$ gal. per square yard. While the surface is still hot, $\frac{1}{2}$-in. stone is applied, then the road is opened to traffic, and two months later a seal coat is applied at the rate of slightly less than $\frac{1}{2}$ gal. per sq.yd. and the whole is covered with sand. Mechanically mixed asphalt has recently been used instead of hand-poured grout in the belief that equal satisfaction will be obtained with less asphalt. An asphalt-mixing plant, costing about $35,000, was installed in 1929 to expedite the renovation of pavements.

Waterworks — Until November, 1914, the water supply of Bangkok was obtained from roofs, canals, ponds and ditches in such a condition, particularly during the dry season, as to be unfit for human consumption. In accordance with the progressive spirit of the government, a public water supply was installed to improve the conditions in the city. The works were opened in November, 1914.

The public water supply is taken from the Menam Chao Phya 25 miles above the city at a point not reached by brackish or highly polluted water. An old channel of the river has been converted into a reservoir by the construction of earth dams at its upper and lower ends. This reservoir is 5 miles long, from 200 to 300 ft. wide and 6 to 20 ft. deep, with a capacity of 53,000,000 gal. Water is led from the reservoir to the city through an open canal 16 miles long, 42 ft. wide and 10 ft. deep. There are outlet gates from the canal to the river, by

EXPENDITURES ON IRRIGATION PROJECTS IN SIAM

Expressed in gold dollars on the basis of one gold dollar equal to two ticals

Project	Total Cost Estimated	Year of Completion	Expenditure up to March 31, 1930	Proposed Expenditure up to March 31, 1933
Prasak South Canal	7,786,841	1923	7,890,384	Complete
Prasak North Canal	625,000	....	81,167*	
Nakom Nayok	5,255,168	....	283,343	2,690,750
Menam Noi	800,000	....	.....	.....
Subhan	5,747,042	....	2,267,820	1,706,850
Hill Irrigation Mondhol Bayab	1,000,000	1933	250,000	750,000
Siengrak and Bang Hai Drainage	3,889,380	1931	3,377,860	511,520
Miscellaneous	.....	....	45,000	181,759
Total	25,103,431	....	14,195,574	5,840,879

* Up to March 31, 1926.

means of which the supply canal can be flushed into the river at low tide. Great precautions have been taken to keep the supply canal free from pollution. A royal decree, rigidly enforced, forbids the use of the canal for navigation, fishing, bathing, washing or any other purpose that might pollute the water.

Water is pumped from the end of the supply canal, within the city, to an adjacent filter plant, which is of the rapid sand type with a capacity of 17,500,000 gal. per day. This plant consists of four coagulating basins, each with a capacity of 200,000 gal. Two new basins with a capacity of 1,160,000 gal. were installed in 1929 to increase the period of retention. The total capacity of the coagulating basin is now $1\frac{1}{2}$ million gallons, which should be sufficient until the consumption reaches $18\frac{1}{2}$ million gallons per day. Aluminum sulphate is added to the water in the force main from the low lift pumps, about 100 ft. from the coagulating basins. The alum is added at the rate of about $1\frac{1}{2}$ to 2 grains per gallon, containing 18 per cent Al_2O_3. For two or three days a year, when the natural alkalinity is low, soda ash is added to improve the coagulation.

There are two filter houses, one completed in 1914 and the other in 1930. The older building holds twelve circular steel tub filters of the Jewell gravity type with mechanical rakes. The capacity of these filters is $6\frac{3}{4}$ million gallons per day. There are to be twelve units in this new filter house, with a total capacity of $10\frac{3}{4}$ million gallons per day. These are rectangular concrete boxes of the Jewell gravity type, using compressed air instead of mechanical rakes in washing. Clear water flows from the filters to the clear water storage basin, which is in two compartments with a total capacity of $1\frac{1}{2}$ million gallons. The clear water basin is of reinforced concrete, and the roof is covered with a thick layer of earth. The clear water is chlorinated, as it enters the suction of the high lift pumps, by two chlorine units of the Paterson type. These units have been in operation for about a year. The strength of dose is between 2 and $3\frac{1}{2}$ p.p.m.

Daily checks are made of the quality of the water by chemical and bacteriological analyses of raw water, settled water, filtered water and tap water. These analyses have always shown the quality of the water to be much superior to the requirements of the U. S. Public Health Service for interstate carriers. The new filters and building are being erected at a cost of $130,000.

The pumping station is equipped with six centrifugal pumps directly connected to electric motors. Raw water is lifted from the canal to the settling basins by two of these pumps, each with a capacity of 5,000 gal. per minute against a total head of 30 ft. The filtered water is lifted through four high lift pumps, with a capacity of 4,000 gal. per minute against a head of 100 ft. Electric power is from the government power station.

High lift pumps force the filtered water into a 20-in. pipe about $2\frac{1}{2}$ miles long which discharges into two elevated reinforced-concrete distributing reservoirs, each with a capacity of 264,000 gal. These reservoirs are located in the heart of the city, the topography of which is flat. The distributing system which leads from these reservoirs covers the city, an area of approximately $4\frac{1}{4} \times 6\frac{3}{4}$ miles. There is a total of 75 miles of cast-iron pipe 34 to 28 in. in diameter. The system is equipped with about 400 public hydrants, of which 280 have 4-in. connections for fire engines. These hydrants are provided by royal decree in order that the poorer classes may have potable water free of charge. The public water supply is the only potable supply within the city of 600,000 inhabitants, yet there are only 8,000 customers and it is known

Bridge carrying a street over a canal in Bangkok

that water is still taken from polluted sources. All water is metered and is paid for on a sliding scale which starts at about 50c. per 1,000 gal. The average rate of consumption during 1929 was 4,720,000 gal. per day, with a maximum day of 5,966,000 gal. Income from the sale of water pays all expenses of the waterworks.

Extensions to the water-distribution system have so reduced the pressure in the low portions that a comprehensive relief system is now under construction. It is to be completed in two years at a cost of $630,000.

The Memorial Bridge—A monumental bridge is being constructed at Bangkok to commemorate the 150th anniversary of the present dynasty, which will occur in 1932. This bridge is the largest piece of engineering work now in progress in Siam. It is located in the center of Bangkok and will span the Menam Chao Phya. It will be the only bridge across the river at Bangkok and will give access to the undeveloped part of the city on the west bank.

The bridge will be of steel with a length of 755 ft. between abutments. There will be two end spans covered by through trusses, each 275 ft. long, and a two-leaf bascule span of 275 ft. Each of the concrete approaches is 500 ft. long. Foundation conditions are difficult and the caissons for the two piers will be sunk to a depth of 90 ft. below the river surface and 40 ft. below the river bed. The bridge will have a roadway 33 ft. wide with two sidewalks, each 8 ft. 6 in. wide, cantilevered from the main girders. There will be a clearance of 25 ft. from the closed bascule span to the river at high tide. There will be about 1,200 tons of steel in the superstructure. Erection is being done by Dorman, Long & Co., of London. The work is to be completed in April, 1932, at an estimated cost of $1,500,000.

Expert Testimony on

Wind Design for Tall Buildings—I

* * *

A Review of Current Theories

By DAVID CUSHMAN COYLE
Consulting Engineer, New York City

WITH windbracing theory in the melting pot, the time seems favorable for making a brief survey of the various methods now in use. It is probable that out of these current methods will be built the common practice of the future, by the choice of some, rejection of others and refinement of the empirical units employed in the theories chosen.

The Portal Theories

1. The theory known as Fleming's IIA starts with the assumption that each story is divided into portals, each consisting of one beam and the two adjoining columns, the columns extending from a contraflexure at mid-story below this beam to another at mid-story above. The total shear in the bent is equally divided among the portals of the bent. In actual practice it is usual to consider that the floor slab equalizes the shears among the bents, so that the total shear in the story is equally divided among all the portals of that story. This shear is made up of the total wind load down to mid-height above the floor, multiplied by the story height, plus the local wind load at the floor, multiplied by half the story height. In practice the total wind may be figured down to the floor level, and this load times the height between mid-points of columns is the total moment in the story. Each portal takes an equal share of this moment, and the bending in each beam connection is the same and equal to the total moment divided by the number of connections. The bending in the columns above and below the floor totals the same as that in the connection, allowance being made for the reduced arm due to the depth of the beam. The vertical load on the column is the overturning on each portal divided by the column spacing. Interior columns are common to two portals and have twice as much bending as end columns, with no vertical load where the column spacings are equal.

2. A refinement of method No. 1 assumes that a column turned with flanges parallel to the wind takes half as much bending as one turned in the strong direction. Therefore, all connections are proportioned so that, according to the number of connections on the column, they will total half as strong for the weak columns as for the strong ones. The shears are distributed accordingly and the vertical load on any column is the algebraic sum of the shears in the connecting beams, assumed as being in each case the strength of the connection divided by half the span.

Distortion of wind bent under portal theory assumptions

3. A further refinement assumes that the columns take bending and shear in proportion to their moments of inertia in the direction of the wind. The connections at each column are designed to be strong enough to apply the bending attributed to that column, and the vertical load on the column is figured as in method No. 2.

4. A still further refinement distributes the shears to each joint in proportion to the I/L of the column sections and beams meeting at the joint. The shears so determined fix the necessary strength of the connections, and the vertical loads on the columns follow from the shears in the beams. The bending stresses are checked to see if they exceed the allowable stress; if they do, the members are increased and the shears redistributed accordingly.

5. The Morris-Ross method is more refined than No. 4 in that the rotations of the joints are taken into consideration. It is the slope-deflection theory, somewhat simplified by the use of diagrams. Another method using Prof. Hardy Cross' system of balancing moments is being proposed.

Conclusion—All the portal theories described above are based on the following assumptions: (a) The floor remains plane and level. (b) The members do not change their length.

They all have in common the following order of procedure: (a) The total wind shear from the building above is distributed to the various columns more or less in proportion to the stiffness of the columns and beams. (b) The bending moments are figured and the connections designed for strength. (c) The vertical loads on columns are obtained from the shears.

The Cantilever Methods

6. The assumption in the theory known as Fleming I is that the bent as a whole from top to bottom of the building is deflected by the wind and that the vertical loads on the columns are proportional to their distance — plus or minus — from the neutral axis. At any floor, then, the vertical increment, or shear applied by the beams, is proportional to the distance of the column from the neutral axis. It is also assumed that the points of contraflexure are all in the middle of the members. As the shear on both ends of any

beam is the same and the shears in the beams on opposite sides of an interior column are opposite in sign, it is possible to find all the shears by starting with the end bay and making the algebraic sum at each interior column equal to the assumed vertical increment for that column.

As a starting point, the shear in the end beam is equal to the increment of vertical load in the end column as found above. Having found the shears in the beams, the connections are designed to be strong enough to carry the corresponding bending moments at an allowable unit stress. The beams are also designed for bending at the allowable stress.

The amount of wind carried by any given bent is figured either as the pressure on the corresponding width of building or, assuming the floor to distribute the loads, as an equal share of the total or any other convenient proportion.

7. The total wind load in Spurr's theory is distributed to the several bents in proportion to their stiffness, i.e., to the amount of load they will take while deflecting an equal distance due to the change in column length alone. No account is taken initially of the deflections due to web action. The stiffness is figured from the areas of the columns and their distances from the neutral axis.

In a given bent the vertical unit stresses are assumed to be proportional to the distance of each column from the neutral axis and having the column area, the vertical loads may be found. At a given story the load increments, or vertical shears, are found in this manner, and from them are found the shear in each bay and the corresponding horizontal shear.

From the vertical loads on the columns it is possible to compute the deflection of the top of the building due to the changes in column length; this deflection is, of course, the same for all the bents. An allowable total deflection is assumed (also equal for all bents), and the difference is the allowable "drift" or deflection due to web action alone.

In any bay, therefore, the horizontal shear in the bay being known, as well as the allowable drift per story, the bracing is made stiff enough to carry the shear, while the bay deflects the allowable distance horizontally. In figuring this bracing the sections are assumed, and the drifts due to beam bending, column bending, connections, stress in diagonals, etc., are separately computed. If they add up to the allowable total, the assumed sections are correct. The drift found in this way must not be much greater nor much less than that allowed, else the bay will carry too little or too much shear in comparison with other bays and will, therefore, load the column either too little or too much.

Two features deserve special note. Strength and allowable unit stress are not primarily of interest. The unit stresses in practice are usually well below those allowed by the codes. The other point is that if the bracing is correctly designed to give the assumed drift (equal to all other bays) while carrying the assumed shear, then the vertical loads applied to the columns will be as assumed, the change in column lengths will be proportional to their distance from the axis, and the floors will all remain plane, although not level, as required by the theory.

Conclusion—The assumptions of the cantilever theories, as contrasted with those of the portal theories, are as follows: (a) The floors remain plane but not level. (b) The columns change their length, and the beams do not.

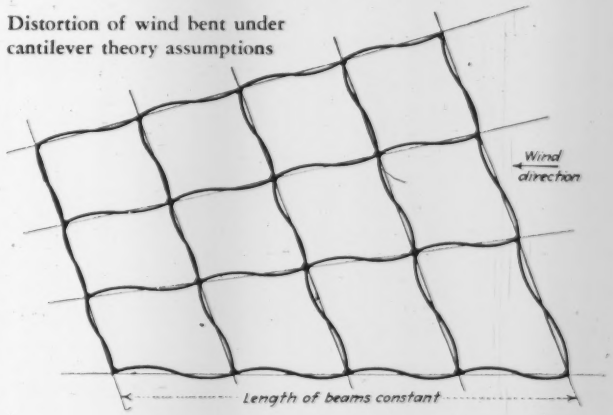
The order of procedure for the cantilever theories is: (a) The total overturning moment is carried by vertical stresses, which are distributed to the columns in accordance with their distance from the neutral axis. (b) The shears are computed from the vertical loads. (c) The bending moments are figured and the connections designed for strength in No. 6 or for stiffness in 7.

Possible Future Trends

In the opinion of the writer the further development of windbracing practice should proceed along the following lines. There are three types of buildings with which we have to deal:

A. For small or light structures such as houses, radio towers, armories, train sheds, hangars, mill buildings, etc., which require bracing to prevent collapse, the portal theories are appropriate, and the method chosen should vary from No. 1 to one of the high elastic theories, according to the size, complexity, lightness and importance of the structure. Obviously a two-story house in Florida requires substantial bracing but need not be designed in accordance with elastic theory, while a two-hinged arch over a large drill hall may well justify a lot of mathematics. In this class of structure the change in length of members is generally so small that theories that neglect it are suitable.

Distortion of wind bent under cantilever theory assumptions



B. This type comprises buildings with masonry walls, fireproof partitions, no large rooms that eliminate floors and columns and a base fairly large compared with the height. For such buildings little if any bracing is required, as they will neither collapse nor sway uncomfortably. For these structures the law is the determining factor, and the writer recommends method No. 1 or No. 2, as being simple to use and giving in practice the degree of safety required by the law. There are few types of connections, and fabrication is easy. It is true that these theories have a rather vague relation to the actual stresses, but experience has shown that no bad results come from their use in this type of structure.

Buildings that are not very tall or slender but have large rooms in the lower stories are in class *A*, i.e., they require substantial bracing; but the part of the structure in which the bracing is required is not so extensive that changes in column length need be considered. Their tendency to vibrate, like that of some other types in class *A*, is sufficiently met by a strong bracing for 30 lb. of wind.

C. Herein are included tall or slender buildings intended to be occupied by people. In these structures the important question is one of vibration or sway. The

method to be used depends on the size and importance of the structure. A twenty-story building on a 30-ft. lot may well be designed by method No. 1, the sway being taken care of by using full 30 lb. of wind down to some point near the ground. Most of the tall towers in existence have been designed by this method or by one of its more refined variants. In general, those designed for 30 lb. of wind are stiff, and those where 20 or 10 lb. was used are not stiff. In many cases considerable material was wasted due to the inaccuracy of the theory.

Where the importance of the project justifies the use of the best engineering talent, it seems evident that method No. 7 is the only one that can be said to meet the requirements, both because it provides for keeping the floors plane and because it does not allow the engineer to forget the deflection. As the unit stresses involved in this method are small, the law need not be considered, since its requirements are more than met.

It should be emphasized that the difference between the slope-deflection theory, or any portal theory, and No. 7 is that the former does not provide any means for forcing the floors to remain plane. Such theories, therefore, are tarred with the brush of inaccuracy when applied to a tall and slender tower; while No. 7, where it can be fully applied, should have no theoretical major inaccuracies, provided the method of computing the stiffness of the various parts of the bracing is reasonably correct.

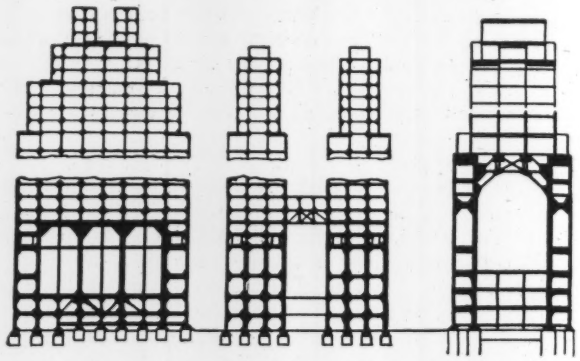
Unit Loads—The problem of unit loads has been very much misunderstood. The wind pressure to be assumed on a given building depends on many other things than the recorded velocities and the formulas for velocity and pressure.

In the class *A* structures listed above, where danger of collapse must be absolutely eliminated, the maximum expected pressure is of course the determining factor; and the engineer will use his judgment in choosing his assumed load, with suitable regard to its relation to the safety factor corresponding to his unit stresses.

In the class *B* structures the legal pressure, whatever it may happen to be, is the value to be used. The actual stresses are sure to be less than the required pressure would indicate. The engineer's judgment that a building is in this class cannot of course be taken into consideration by the law, so it is proper that the bracing legally called for should be used as a matter of form.

In the class *C* structures the assumed pressure has two aspects. First and most important, it is the numerator of a fraction in which the assumed allowable static deflection is the denominator. The fraction represents the stiffness and is a real quantity; but both its constituents are nominal and have no absolute reality except in relation to each other. The other aspect is the question of stability against overturning, and it is apparently not a very pressing problem, as any of the proposed loading systems seem to be well on the safe side. It will be possible to check up these loadings by taking vibration readings at different heights in a tower. If they are found to show a constant frequency, indicating that the tower is vibrating as a simple cantilever, the stiffness of the tower can be computed from the frequency and the dead loads. Then if the static deflection is measured, it will give an equivalent nominal wind loading that represents the combined effects of pressure, friction and suction for the particular wind observed. This procedure will serve as a check on the assumed loadings for stability purposes, but it hardly seems in advance that anything very startling will appear.

It is evident that as the practice of windbracing develops it is not growing in the direction of making the bracing of buildings a good field for amateurs. No standard method is likely to result that the office boy can look up in the book and play on the adding machine. No standard loadings are likely to be found that can be used blindly for any buildings outside of class *B*. No standard criterion for classifying all buildings in such classes as *A*, *B* and *C* is likely to be set up that can be followed blindly. No standard allowable static deflection is likely to be established that can be applied at random to buildings of all sorts of exposure, slenderness ratio and type of occupancy. Wind design is an art as well as a science.



Wide knowledge and ingenuity are required to design satisfactorily such wind bents as these

One of our most distinguished engineers was visited not long ago by a man who had been entrusted with the structural design of a tall tower. The visitor said he had come in to ask how you do windbracing. How do you play a violin?

The second article in this series will be published next week.—EDITOR.

Removable Railway Bridge

A GIRDER bridge that can be folded up for the winter when traffic is stopped and heavy avalanches sweep down the gorge is used on the Furka-Oberwald Ry., in Switzerland. In summer this mountain line forms part of a through route of meter-gage railways, largely for tourist travel, but in winter the trains are diverted, as the traffic is too light to warrant the expense of keeping the line open in a region of heavy snowfall, with a summit elevation of 7,120 ft. above sea level. According to the *Railway Gazette*, of London, avalanches twice carried away the steel bridge crossing the Steffenbach gorge, and for the third structure the engineers designed a folding or removable bridge.

Three girder spans (length not given) are supported by masonry abutments and two inclined steel struts, which are seated in the sides of the gorge and extend outward at an angle of about 45 deg. These struts have pin bearings in the shoes, and the middle girder span is pivoted at one end. In removing the bridge, a derrick is mounted on the shore span adjacent to the free end of the middle span, which latter is then lowered, the span revolving until it hangs vertically from its end pins. Then the shore span to which it is pivoted is drawn back horizontally until the tower and the middle span lie inclined back against the face of the abutment. Finally the other shore span is drawn back in the same way, pulling its supporting strut with it until the top of the strut rests against the abutment.

Drought Problems Studied by A.W.W.A.

Pittsburgh is scene of 51st annual convention of national waterworks organization—Treatment problems attract much interest—Work of revising manual continues

(Engineering News-Record Staff Report)

DETAILED ATTENTION to the 1930 drought and its effects on public water supplies featured the 51st annual convention of the American Water Works Association at Pittsburgh last week. The subject was considered in all its phases, but the taste and odor problems that arose received the largest share of attention. At both the main sessions and the meetings of the purification division, developments in the removal of disagreeable tastes and odors were given lengthy discussion. Other subjects of more general interest, including the Colorado River aqueduct to supply water to the Los Angeles metropolitan district, corrosion problems and the Pittsburgh water-supply system, were treated at the general sessions of the convention.

Drought Problems

Experiences with water systems during the 1930 drought with respect to quantity and quality problems were the occasion of extended treatment. One entire general session was devoted to the subject, and many of the papers before the purification division either discussed it directly or used the drought experiences to illustrate the points brought out. Two broad pictures of the effects of the dry months were given by engineers connected with waterworks holding companies: F. R. Berry, of the American Water Works and Electric Co., and Reeves J. Newsom, of the Community Water Service Co. Both companies operate a number of systems in the territory most seriously affected. In general, demand increased with the decrease in rainfall and streamflow, and undesirable chemical content increased, resulting in disagreeable tastes and odors and in increased hardness, salinity and, in some districts, acidity.

Four discussions were offered as to the need for revision in the basic assumptions of design, by Paul Hansen, Chicago; John F. Laboon, Pittsburgh; N. T. Veatch, Jr., Kansas City; and Ezra B. Whitman, Baltimore. Mr. Hansen called attention to the fact that water demand has a tendency to increase more rapidly than population. The disproportionate cost of facilities necessary only under extreme conditions seems to justify the institution of a demand charge in the water-rate schedule. The fact that some streams dried up completely during 1930 was interpreted by Mr. Laboon to mean that assumptions as to minimum streamflows are of little meaning. He also cautioned designers not to be stampeded into further increases in safety factors in the construction of supply works. All cases of acute shortage during the drought occurred in the supplies for smaller communities, largely where the water was derived from springs, shallow wells or very small drainage basins. The factor of safety inherent in good design has appeared adequate to carry through a period of extreme rainfall shortage. The large addition to capital involved suggests caution as to any increase in the safety factors now considered best practice.

The drought was given further discussion under the subjects of quality problems and emergency relief measures. Each topic was formally discussed by a group of engineers from communities that experienced difficulties. In the general discussion following the presentation of the symposium a plea was made for the operators of plants with impounding dams or small reservoirs to keep continuous records of water pumped, reservoir levels and spillway discharges, as from those figures accurate determinations of streamflow could be made.

Taste and Odor Removal

A review of present knowledge regarding treatment for the removal of disagreeable tastes and odors was made by Paul Hansen. Treatment methods now in use can be grouped under three headings: aeration, filtration and chemical application. Aeration is effected by spray nozzles, cascades or diffusion apparatus, and probably depends upon dissipation rather than oxidation. Chemicals are applied either to prevent the appearance of noxious tastes or to remove tastes after they have been formed. Superchlorination followed by dechlorination has been used successfully for this purpose, the chief variation being in the dechlorinating methods employed. Dechlorination has been effected by sulphur dioxide, sodium thiosulphate, potassium permanganate and the most recent reagent, sodium bisulphite.

The use of ammonia in combination with chlorine is another type of chemical treatment. The chloramines that are formed prevent the formation of chloro-phenol and residual chlorine tastes, but are not so effective in preventing pure phenol tastes. Their behavior in maintaining sterilizing action for many hours, however, has the added advantage of preventing the aftergrowth of bacteria or micro-organisms in distribution mains.

Activated carbon is used in two forms, powdered and granular. The former, added to the water before or during the purification process, either adsorbs directly or combines chemically with the taste-producing compounds. Filtration through granular activated carbon has proved most effective in removing tastes of all types, although this requires additional plant facilities.

Charleston Experiences—The serious difficulties that arose last fall in treating the water supply of Charleston, W. Va., were described by E. S. Tisdale, director of the West Virginia state board of health. All the treatment processes described by Mr. Hansen were given a trial, with unsatisfactory results. As reported in detail in *Engineering News-Record*, April 2, 1931, p. 565, an unprecedented degree of pollution in Elk River occurred due to backflow of Kanawha River into the intake. An unusual concentration of organic matter, due to sewage discharge into the Kanawha and the decomposition of dumped garbage, resulted in a vile taste in the purified water. Although the purification process rendered the water bacterially safe, outbreaks of intenstinal disorders

followed, probably caused by the presence in the water of an intestinal irritant of a chemical nature. Aeration, ammonia-chlorine, superchlorination, powdered activated carbon and all other known methods of taste removal were employed without success. An experimental apparatus using filtration through granular activated carbon produced a tasteless effluent, but the process could not be used on a plant scale because of the time that would be involved in reconstruction.

Ammonia-Chlorine at Chicago—During the past year H. H. Gerstein, sanitary engineer with the Chicago department of public works, has been conducting a comprehensive test of the bactericidal efficiency of the ammonia-chlorine treatment. It was definitely established that, under Chicago conditions, chloramine sterilization proceeds more slowly than does that by chlorine alone, but the sterilizing effect is more persistent. At a contact period of roughly two hours the two processes are equivalent in sterilization. With less contact, chlorine alone is more effective; with more, ammonia-chlorine gives better results.

Ammonia-Chlorine at Cleveland—W. C Lawrence, superintendent of filtration, Cleveland, reviewed two years' use of chloramine sterilization at that city, presenting the following conclusions: (1) Phenolic and chlorinous tastes can be prevented by the process; (2) bacterial efficiencies are improved; (3) aftergrowths in the distribution system are prevented; (4) lag in sterilization can be compensated by large chlorine dose.

Ammonia Sulphate at Indianapolis—The use of anhydrous ammonia in combination with chlorine was begun at Indianapolis in September, 1930. H. E. Jordan, filtration plant superintendent, reported the change to the use of ammonium sulphate and its results. The decision to change to the use of an ammonia salt was brought about by considerations of relative cost. The ammonia content of the material now being used is 25.5 per cent and the phenol content 0.003 per cent, the latter being so low that it causes no apprehension as to its taste-producing properties. The salt is applied to the raw water so as to keep a chlorine-ammonia ratio of $2\frac{1}{4}$ to 1.

Powdered Activated Carbon—Methods employed at fifteen different filter plants to add powdered activated carbon to the water during the treatment process, together with the results obtained, were described by Malcolm Pirnie, consulting engineer, New York City. The usual method of applying the powder is to run it through a dry-feed machine into a hopper, where water is added and a water eductor picks up the mixture and carries it through a pipe or hose to the point of application. Its adsorptive properties enable it to eliminate taste-producing compounds when dispersed throughout the water in the sedimentation basin, and added effectiveness is obtained by the fine carbon mat formed on the surface of the sand filter beds. Many different points of application have been tried, ranging from the filter bed influent to the suctions of the raw-water pumps. It appears that addition of the carbon directly to the filters in quantities sufficient to be effective causes an uneconomical reduction in periods of filter service. The most intimate contact between carbon and water can be secured by application at the basin effluent or at some point en route to the filters. If no more than 2 p.p.m. is necessary to remove tastes and odors, this method of dosing will prove most economical. When larger doses are necessary it is advisable to carry the material through the sedimentation basin.

Activated Carbon at Bay City—The quality of the water entering the intake of the Bay City, Mich., waterworks, is quite variable, depending upon the wind direction on Saginaw Bay. To produce a water free from objectionable tastes, ammonia-chlorine, alum, lime, and activated carbon are used in the treatment process. Louis B. Harrison, superintendent of filtration, presented a paper describing the results of filtration through granular activated carbon on a plant scale. In operation, potassium permanganate or superchlorination is resorted to for the reduction of the organic load on the carbon filter, thereby increasing its efficiency. The carbon filter was constructed out of one of the original sand filters of the plant, with the installation of a pump to lift the effluent from an adjacent sand filter to the carbon unit. It is used only intermittently, when the character of the raw water warrants it. The total cost of the installation, including 1,400 cu.ft. of carbon, was $5,600.

Revivification of Activated Carbon—A method of reactivation of granular carbon that has been recently developed was described by Paul Mahler, chief consulting chemist, Darco Sales Corp., New York City, and H. B. Crane, principal assistant engineer, International Filter Co., Chicago. This consists essentially of a controlled heat treatment with regulated admission of air. The heat accomplishes the destructive distillation of the adsorbed organic impurities, while the introduction of air at the proper temperature brings about combustion of the volatile decomposition products and of the inactive carbon residue resulting from the distillation. An experimental reactivation tube 3 in. in diameter and 3 ft. long was found to have a capacity of 30 tons of granular carbon in 300 days. The overall loss of carbon averaged less than 10 per cent. The adsorption capacity of the reactivated material was equal to the original carbon.

Purification Division

Manganese—Manganese occurrence and removal were discussed by Robert Spurr Weston, consulting engineer, Boston, before the purification division. Manganese is relatively infrequent and, when present, is usually in small amounts. It is most frequently found in groundwater, but there are numerous reports of its occurrence in surface water also. Its presence is usually due to the decomposition of organic matter in manganiferous soils and the resulting solution of the manganese in the humic and other soil acids. It oxidizes slowly to form the black hydrated manganic oxide, which causes black stains to result from the use of the water. A further disadvantage of the presence of manganese is that it reacts like chlorine to the ortho-tolodine test; residual chlorine tests are thereby made difficult.

Methods in use for the removal of manganese are similar to those for the removal of iron. Manganese salts in alkaline waters oxidize slowly and ultimately precipitate as manganic hydrate. It is difficult to remove the hydrate from the water, as precipitation is relatively slow. It his been shown that micro-organisms, crenothrix and manganese bacteria play an important role in manganese removal. Preliminary treatment is more important in using removal devices for manganese than for iron. In the softening process, it is readily removed by lime with the aid of ferric sulphate. Manganese must be oxidized, coagulated, and the insoluble hydrated oxide removed by filtration. The coagulation of the small amount of manganic hydrate in dilute solution is the difficult step in the process. Organic matter often interferes, but the presence of organisms on the filtering material is desirable. Contact aerators or tricklers should be

deep enough to provide ample time of contact. Storage before filtration is usually beneficial.

Filter Sand—The desirability of cooperative effort in studying the characteristics and behavior of filter materials for waterworks was the subject of a lengthy discussion by W. E. Stanley, with Pearse, Greeley & Hansen, Chicago, and James W. Armstrong, filtration engineer, Baltimore. Mr. Stanley described the program of experimental work being sponsored by the filtering materials committee of the American Society of Civil Engineers, of which he is chairman. Fourteen filter plants at strategic locations throughout the country have set up batteries of glass-tube filters filled with sands of different size. The object of the experiments is to determine the effect of sand size upon periods of filter service and the results of variations in raw-water characteristics.

Observations on the behavior of the experimental tube filters at Baltimore were presented by Mr. Armstrong. In general, those observations indicate the desirability of coarser filter sand for efficient performance. The tubes containing the coarse sand gave longer periods of service and were cleaned more effectively by the backwash than were those filled with fine sand. While the flocculated material formed a dense mat on the surface of the fine material, it slowly penetrated the coarser sand beds. During washing, the large sand grains were subjected to a greater degree of abrasion against neighboring grains than were the fine ones. In some tests on the lifting effect of the wash water on the sand bed the characteristic curves did not show the proportionality between expansion and wash rate found in tests at Cincinnati in 1915 and at Detroit in 1928.

Pittsburgh Problems

Acid Mine Drainage—The seriousness of acid pollution by mine drainage into the streams of a coal region was presented by Chester F. Drake, superintendent of the Aspinwall filtration plant at Pittsburgh. Water flowing from both active and abandoned mines is nearly always highly acid and, when not diluted sufficiently, renders the river water difficult or impossible to treat. Marl, lime and soda ash are used extensively in the Pittsburgh district. In general, however, treatment processes for acid mine drainage, both in this country and abroad, are highly unsatisfactory. The solution for the problem seems to be in preventing mine drainage from entering streams used for public water supplies. The Pennsylvania Sanitary Water Board has been working in cooperation with the coal operators of the state to reduce this type of pollution. Principal operators in the bituminous coal field have entered into an agreement with the board under which the drainage from existing mines will be concentrated or diverted, where practicable, and new mine openings and points of drainage will be so located as to confine pollution by mine water to a minimum. Mr. Drake advocated the sealing of abandoned mines and the burning of outside culm piles.

Pittsburgh Water System—The peculiar topography of Pittsburgh results in water-supply problems of unusual difficulty, as was pointed out by James H. Kennon, managing engineer of the Pittsburgh department of water. The many steep hills and narrow stream valleys require a number of irregular-shaped pressure zones and much duplication of feeder mains. The highest point in the city is less than 2 miles from the Ohio River, but is 670 ft. higher in elevation. The Pittsburgh waterworks is on the north bank of the Allegheny River; from that point the filtered water is pumped by two pumping stations to the various distributing reservoirs.

Distribution pipes for the eight pressure zones are interconnected for emergency use, but normally they are operated independently. Each zone has its own storage reservoir or tank into which the water is pumped and from which it flows by gravity into the distribution system. While the system is favorable to low power costs, the capital charges resulting from the subdivision of the distribution system are relatively high.

Distribution

Corrosion—Two places on the program were given to a discussion of corrosion problems: a paper by H. R. Redington, J. L. W. Birkinbine and F. N. Speller, of the National Tube Co., and a symposium on the subject opened by Malcolm Pirnie. Of these, the first reviewed the present status of corrosion prevention, with special reference to steel pipe. Some cases have developed where pipe plates have been perforated by corrosion, but the authors showed that such holes did not weaken the pipe materially. Modern welding methods and improved protective coatings make the chance of such failures more remote. Up to the present time metallurgists have not succeeded in producing a low-cost steel alloy that will resist soil corrosion materially better than good open-hearth steel.

Malcolm Pirnie's opening statement in the corrosion symposium summarized the present state of knowledge of the causes of pipe corrosion and the remedies in use. It is now known that carbon dioxide in a soft water containing oxygen will cause solution of iron. A practicable method of overcoming the difficulty is by giving the carbon dioxide something with which it can combine chemically. Lime, caustic soda and soda ash are all used for this purpose, but the last mentioned will not reduce bicarbonate alkalinity in a soft water.

The effect of corrosion and tuberculation on the frictional resistance and, consequently, the cost of pumping was discussed by Arthur T. Clark, chief engineer of the Community Water Service Co., New York City, who pointed out that an increase in friction coefficient causes a disproportionate increase in the power required to pump a given quantity of water through a long pipe line, and that, therefore, the economic aspect of tuberculation is of utmost importance.

Valves—A symposium before the plant management and operation division dealt with experience in operating gate valves. Seth M. Van Loan, deputy chief of the Philadelphia bureau of water, emphasized the need of adequate maintenance to assure proper condition in times of emergency. Multiplicity of parts was condemned and standardization was advocated. Philadelphia has developed a standard type of gate valve, and purchases are now made on the basis of the prepared design. L. D. Gayton, city engineer of Chicago, summarized the experiences of the engineer charged with the operation of a distribution system. Many times he is handicapped by the purchase of inferior valves and by insufficient funds to allow adequate maintenance, but he is still held responsible for any shortcomings in service. In purchasing valves on an open market specifications must be so broadly written that inferior equipment cannot be ruled out. In Chicago, valves are now contracted for on the basis of the department's standard.

Colorado Aqueduct—In a paper entitled "General Features of the Colorado River Aqueduct for Supplying Water to the Cities of Southern California," written

by Julian Hinds, chief designing engineer of the Metropolitan Water District of Southern California, and presented by S. B. Morris, chief engineer of the Pasadena water department, this mammoth project was given extended discussion. Water is to be diverted from the Colorado River below the Hoover Dam and led through 267 miles of tunnel, lined canal, pressure pipe and siphons. The country to be traversed is extremely rugged and the geology is complex. The topography, relative elevations of the river and the territory to be served and the friction losses in the long line require the construction of a number of pumping stations along the route. Preliminary engineering work is now nearing completion and final location of the main aqueduct is under way. The long tunnels will be ready for construction by the time financial arrangements can be made.

Storage Tanks—Recent developments in elevated tanks were described by J. O. Jackson, chief engineer of the Pittsburgh-Des Moines Steel Co. In a waterworks system without stored reserve it is necessary to provide supply, pumping and distribution facilities with a capacity equal to the maximum rate of demand. Stored reserve allows a reduction in size of the production facilities, resulting in economies in capital outlay, fixed charges and operating costs.

Public Relations—A scale whereby the public relations of a water utility may be rated is being developed by subcommittee 9 of the waterworks practice committee; the present status of the work was presented to the finance and accounting division by Howard S. Morse.

Personnel Service Ratings—The Probst service-rating system, which is being tried out by the Detroit civil service commission, was described by Joseph F. Majeske, superintendent of the personnel bureau at Detroit.

Low Streamflow Likely Until Winter Because of Depleted Groundwater

Studies by Geological Survey reveal abnormally low water table—Correlation of streamflow with groundwater level foreshadows unusually low river stages for summer and fall

By KENDALL K. HOYT
Washington, D. C.

SERIOUS depletion of groundwater is reported by the U. S. Geological Survey in a summary of data just compiled on the 1930-31 drought. This fact, together with the demonstrated correlation of streamflow with volume of soil storage, leads to the prediction that river stages will be unusually low for at least the summer and fall seasons of 1931. Supplies will therefore be short in many regions regardless of rainfall, except in communities having ample reservoir storage.

An Extreme Drought—The Survey's report, based on studies by 32 district offices of the water resources branch, gives the first comprehensive statement of runoff conditions in the drought; hitherto only rainfall data and some isolated figures on streamflow have been available. It also contains observations on groundwater level, which, like the runoff data, were collected by the district offices of the Survey. They fully confirm what has already been concluded from the rainfall figures: that the drought was the severest occurrence of its kind on record and is likely to stand for years as a low point on which future estimates of supply will be based.

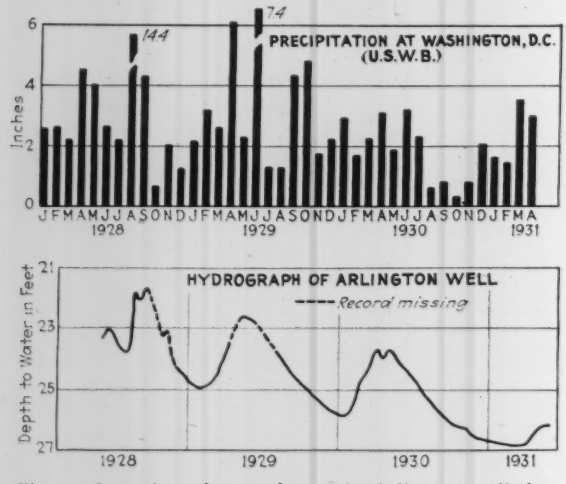


Fig. 1—Lowering of groundwater in Arlington well due to the 1929-30-31 dry period

Droughts Recur—Studies of past rainfall and streamflow records show clearly that droughts are recurrent and that another drought of 1930 severity is almost mathematically certain to happen again. Notwithstanding opinion of old residents to the contrary, the 1930 drought was not unparalleled. It was the severest in 50 years of definite record, but three others during this same period were comparable in extent, rainfall deficiency and attendant heat: those of 1881, 1894-1895 and 1910, fifteen years apart on the average. The 1930 drought, however, was of exceptional effect not only because of the economic depression but also because the demand and uses for water have increased since the drought of 1910.

Rainfall and Runoff—Rainfall was below normal in 40 states, and in 19 of these states previous minimum records were broken. During 1930, 55.9 per cent of the area of the non-arid states had deficient precipitation, as compared with 54.3 per cent in 1894, 44.5 per cent in 1895, and 50.4 per cent in 1910. On this comparison 1930 was the driest year yet by a small margin, and the longer duration of dry weather and excessive heat aggravated its effect.

Runoff conditions can not be stated so precisely, be-

RAPPAHANNOCK RIVER NEAR FREDERICKSBURG, VA.—DRAINAGE AREA 1,590 SQ.MI.

Calendar Year	Number of Days With Discharge in Sec.-Ft. Less Than—											
	10	20	40	60	80	100	125	150	200	300	400	500
1908	..	..	..	..	..	..	..	..	..	..	9	12
1909	..	..	..	..	..	..	..	..	16	92	123	145
1910	..	..	..	..	..	..	3	5	18	32	74	119
1911	..	..	..	..	..	..	8	15	24	43	83	104
1912	..	..	..	..	..	..	..	..	..	4	20	28
1913	..	..	..	..	..	..	3	12	32	58	74	103
1914	..	..	..	..	1	9	40	53	64	99	129	151
1915	..	..	..	..	..	..	..	..	..	..	7	30
1916	..	..	..	..	..	..	..	..	..	19	34	71
1917	..	..	..	..	..	..	..	..	..	9	24	65
1918	..	..	..	..	..	..	..	..	1	23	68	95
1919	..	..	..	..	..	..	..	5	12	33	60	78
1920	..	..	..	..	..	..	..	..	..	..	..	18
1921	..	..	..	..	..	..	8	32	51	64	87	105
1922	..	..	..	..	..	..	..	..	11	55	95	115
1923	..	..	..	..	..	..	..	..	5	19	29	49
1924	..	..	..	..	..	..	..	..	..	..	..	19
1925	..	..	..	..	8	14	31	39	60	94	130	147
1926	..	..	..	..	..	..	..	5	10	29	45	57
1927	..	..	..	..	..	..	..	..	11	32	53	66
1928	..	..	..	..	..	..	..	..	..	2	5	15
1929	..	..	..	..	..	..	..	..	3	35	52	73
1930	4	40	82	112	136	155	167	174	181	192	209	216

cause available records in most regions are too short to establish a normal. But the accompanying duration table for the Rappahannock River, cited as a typical example, brings out the marked flow deficiency in 1930.

Groundwater Conditions—The effect on groundwater is represented by the hydrograph from the Arlington well near Washington, D. C., with a bar graph of precipitation for comparison. It will be noted that the well level for 1929 was below that of 1928, although 1929 was a fairly wet year. While the 1928 rainfall was heavier in the months when the well was rising, yet the sharp decline through 1930 and the failure of the well to recover during the 1931 filling period is significant.

Current well records show a stationary level far below that of last year. A further drop is expected to take place, maintaining abnormally low levels until fall or later. This condition is widespread. It leads to a positive prediction of low streamflow next summer.

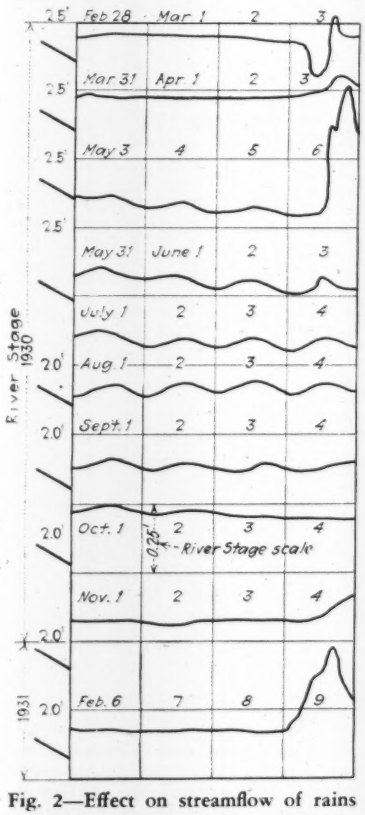


Fig. 2—Effect on streamflow of rains and plant transpiration, as shown by hydrographs of south fork of Mills River at The Pink Beds, N. C.

Spring rains, seeping down to the zone of saturation of the soil, raise the groundwater level; but after the growing season the vegetable cover retards percolation, and most or all of the rain goes off in runoff or transpiration. Evaporation and plant growth can consume 3½ in. of rainfall per month in the growing season. During the spring the upper soil water contributes to streamflow, but in the summer, without rain, flow is dependent upon groundwater from the zone of saturation.

The effect of transpiration upon streamflow is shown by hydrographs from the South Fork of the Mills River, N. C. The high peaks are due to rains, the effect of which soon disappears; the other flow is based upon groundwater. In the winter months the flow is steady—almost a straight-line hydrograph. Through the growing season the graph changes into a sine curve, fluctuating daily as transpiration takes its share of the supply during daylight and diminishes during the night, with a lag before the effect shows up in streamflow. Increased

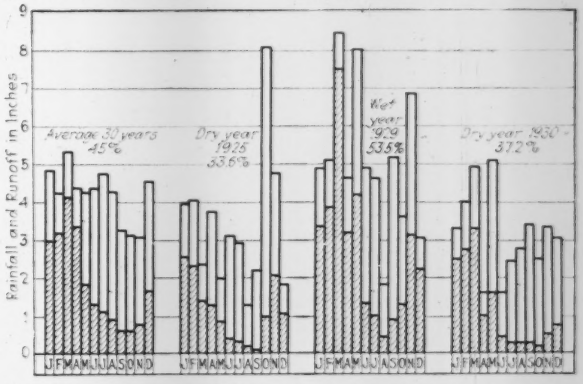


Fig. 3—Runoff ratio high in wet years and low in dry years
Monthly graphs of rainfall (open bars) and runoff (hatched bars) for combined Tennessee and Cumberland rivers.

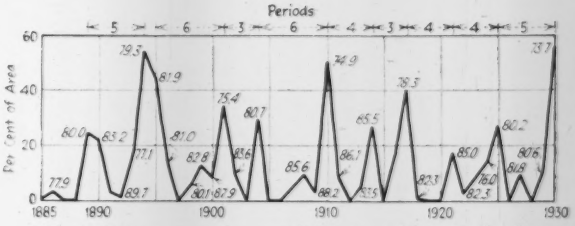


Fig. 4—Percentage of area of 36 non-arid states having deficient rainfall
Scattered figures are ratios of actual to mean average rainfall.

flow after light rains too small to cause surface runoff and the resumption of flow without rain in some streams after the growing season has passed give further proof of the importance of transpiration.

Runoff Ratio Low in Dry Years—Low runoff in drought years is due not only to low rainfall but also to decreased ratio of runoff to rainfall. This is shown by the bar graphs of runoff for the combined flow of the Tennessee and Cumberland rivers as compared with precipitation in the same area. The 30-year runoff ratio averages 45 per cent, but in wet years the ratio exceeds 50 per cent, while in dry years it drops to 35 per cent or under. Thus a given deficiency in rainfall means a great deficiency in streamflow.

However, a wide variation in the unit runoff of different areas is found, even in adjacent areas. Observations last year showed that some streams went dry, while others of comparable size in adjacent basins continued through the drought with a fair discharge.

Full Statistical Data Essential—From the data collected and analyzed by the Survey it is evident that further data are necessary to develop fully the intricate relation between rainfall, runoff, and groundwaters. With record low streamflow in prospect this summer for some regions, it is likely that the current year will yield important information to supplement that so far obtained, as a basis for planning water supplies in future.

NEWS OF THE WEEK

McWhorter Named Chief Engineer of Power Commission

Roger B. McWhorter, of New Orleans, La., was appointed chief engineer of the Federal Power Commission, on May 29, on the recommendation of Marcel Garsaud, member of the commission in immediate charge of its engineering activities. Mr. McWhorter was called to New Orleans in 1926 by Colonel Garsaud to act as consulting engineer on flood control matters for the Orleans Levee Board. Colonel Garsaud was familiar with the work Mr. McWhorter had done on flood control in the Miami Valley. He was held in high esteem by Arthur E. Morgan, who planned and superintended the construction of the flood control works designed to protect Dayton, Ohio.

As a member of the staff of the Orleans Levee Board Mr. McWhorter represented that body before the Board of Engineers which studied the use of spillways in connection with the plans for flood control on the lower Mississippi. Later he took an important part in the design and location of the Bonnet Carré spillway and, from 1928 to 1930, was retained by the Mississippi River Commission during its construction.

Mr. McWhorter was born at Riverton, Ala., in 1888, and is an alumnus of the Alabama Polytechnic Institute, where he took the civil engineering course. He served at Muscle Shoals during the construction period and since last September has been chief engineer of the Great Lakes division of the Corps of Engineers. He was one of the chief advisors of the engineering board appointed last year by the governor of New York to prepare a report on the development of the power resources of the St. Lawrence River. Some years previously, when a joint board composed of American and Canadian engineers prepared estimates of the costs of the St. Lawrence project, Mr. McWhorter was in charge of a part of the work.

Injunction Halts Hearing on Incompetency of Engineer

A hearing scheduled to be held in San Francisco, May 27, on the charge of "gross incompetency" against John G. Little, San Francisco, by the California State Board of Registration of Civil Engineers, was stopped by an injunction served by the superior court. The injunction was granted after arguments by Little's attorney, which contended that charges were insufficient for revocation of license, detrimental to his client's professional reputation and would entail a heavy expenditure for providing witnesses and legal counsel.

The charges, which were filed with the board by M. M. O'Shaughnessy, city engineer on San Francisco, and N. A. Eckart, manager of the city water department, resulting from a report prepared by Little on the present water shortage of the city. June 4 has been set by the court as the date when the board shall appear and show cause why the injunction should not be made permanent.

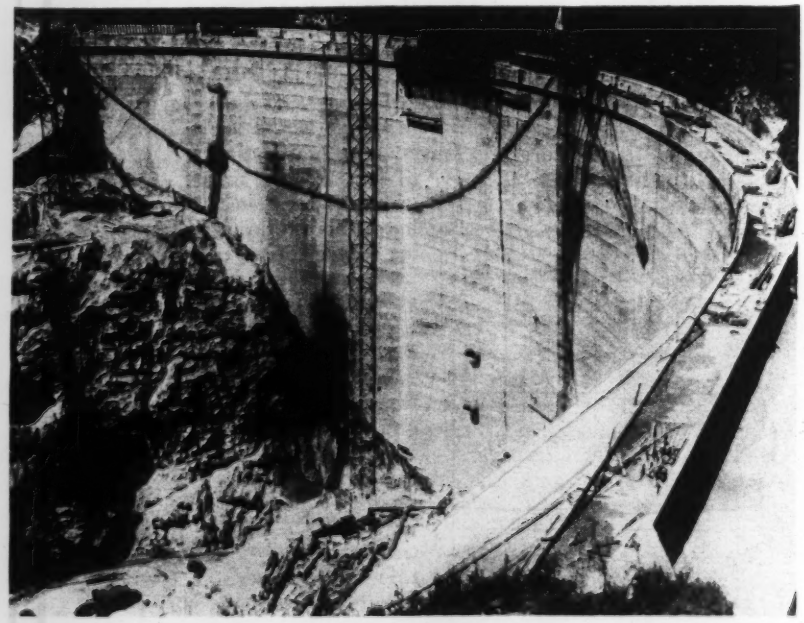
Pennsylvania Railroad Places Large Electrical Order

Orders for $16,000,000 worth of electrical apparatus to be installed in 150 electric passenger and freight locomotives, constituting part of the equipment to be used when electrification of its lines between New York and Washington is complete, have been placed by the Pennsylvania Railroad, which has also announced that its program calls for the later purchase of 80 additional locomotives of other types. The electrical apparatus will be furnished by the Westinghouse Electric & Mfg. Co. and the General Electric Co. Forty-three locomotives are to be delivered this year and the remainder before the middle of 1933, by which time it is expected that the electrification between New York and Washington will be completed.

San Francisco Bridge Contract Contested in Suit

Contract to build the Third St. Channel Bridge in San Francisco, Calif., was awarded May 18 to Barrett & Hilp, of that city, on a bid of $644,280. This bid was on a Strauss type of bascule bridge. The plans call for a single deck, single leaf bascule bridge 140 ft. long and 79 ft. wide. Construction is to be financed jointly by the state and the city. This was not the lowest bid, but was decided upon because of the adaptability of the type of bridge to the location. George Pollock Co., Sacramento, low bidder with a figure of $611,117, presented plans for the American Bridge Co. type, which it is claimed would encroach upon state and private property at this location.

A suit was filed in the Superior Court May 27, 1931, by the Pollock company, claiming that the contract was illegally let in not awarding it to the lowest bidder. The court will be asked to rule that the low bid be accepted or all bids rejected and new bids called. Inasmuch as the bids covered two different types of bridges it is claimed by the city attorney that the board of public works is not legally obligated to accept the lowest bid. Date for the hearing has not been set.



BIG TUJUNGA DAM NEARS COMPLETION

The newest unit in Los Angeles County's flood-control program, the Big Tujunga Dam, is nearing completion in Big Tujunga Wash, 28 miles from the city. The dam, a variable radius arch type, rises 200 ft. above streambed and 249 ft. above deepest foundation. It contains 90,000 cu.yd. of concrete. The Edwards, Wildey & Dixon Co., Los Angeles, is the contractor.

Aeronautic Corporations Unite

The Fairchild Aviation Corp. has announced that it has purchased all the capital stock of the Aerotopograph Corp., of Washington, and that the air-mapping business of this company will be combined with that of the Fairchild subsidiary, Fairchild Aerial Surveys, Inc. The merger brings together two companies that have been pioneers in mapping operations conducted from the air and it is announced that it will make possible important sales and administrative economies and permit an extensive research program.

R. L. Dobbin Heads A.W.W.A.

Detailed advance instructions to both speakers and presiding officers, together with a well-planned program and a rigidly-observed time schedule, resulted in a remarkably smooth-running and effective program at the 51st annual convention of the American Water Works Association in Pittsburgh, Pa., last week. Ross L. Dobbin, superintendent of Waterworks, Peterborough, Ont., was installed as president, and W. W. Brush, chief engineer of the New York City Department of Water Supply, Gas and Electricity, continued as treasurer. The Diven Memorial Medal was awarded to Malcolm Pirnie, consulting engineer, New York City, as the member other than an officer who had best served the association during the past year. This was in recognition of his work with the waterworks practice committee, which has 160 members at work revising the *Manual* of the association.

Announcement was made of the endowment of the John M. Goodell Prize, consisting of $50 and an engraved certificate, to be awarded annually for "a paper which shall be adjudged worthy of special commendation as a contribution to the science and practice of waterworks development, or to a member who has made a substantial contribution to waterworks science or practice in some form other than a paper." The award is sponsored by *Engineering News-Record* in memory of John M. Goodell, for many years editor of the *Engineering Record* and also of the *Manual* of the association.

The Board of Directors decided to take up the question of federal income tax payments by municipal employees in the waterworks field in an attempt to secure a definite ruling from the government. At present the tax is collected in some districts, while in others a return will not be accepted.

Total assets of the association increased $1,000 during the year to a total of $43,000. The 1931 budget is $74,800, slightly higher than last year. Membership increased by 284 to a total of 2,831. Memphis, Tenn., was selected as the location of next year's convention.

Exhibits of waterworks and related equipment were greater in number and more interesting than ever before. Eighty firms were represented. A silver plaque was awarded to the Pittsburgh Equitable Meter Co., which was adjudged by vote of the visitors to have the most instructive exhibit on the floor.

Engineers Discuss Research in Sewage Treatment

Research in the chemistry and biology of sewage treatment was a prominent subject at the fourth annual meeting of the Central States Sewage Works Association, held at Madison, Wis., May 22 and 23. Protozoan digestion reduces organic matter 30 per cent, according to Professor Noland, University of Wisconsin. Thermophilic digestion experiments by the Sanitary District of Chicago, as presented by F. W. Mohlman, chief chemist, indicate that the end of high rate of gas production could be attained in 14 days at 37½ deg. C. and in 10 days at 50 deg. C. Offensive odors developed, with strong supernatant liquor which may be difficult to dispose of. C. C. Ruchhoft, principal bacteriologist, pointed out that of the large numbers of species of organisms present at the temperatures just mentioned only five are capable of growing at 60 deg. C. Frank Bachmann (Dorr Co.) stated that no material advantage is found at 130 deg. F. as compared to 90 deg. F., while 12½ days appears to be sufficient digestion time. Max Levine (Iowa State College) finds that with packing-house sludge 85 per cent of the gas from digestion is produced in nine days at 57 deg. C.

Control of weeds and algae in the lakes at Madison was described by B. Domogalla (State Laboratory of Hygiene). Copper sulphate is found suitable with algae, but arsenate is more satisfactory for weeds, while a power cutter is used to cut weeds below the surface (see *Engineering News-Record*, Dec. 9, 1926, p. 950). Treating the influent to trickling filters at Mason City, Iowa, with 5 to 60 p.p.m. of chlorine proved ineffective in controlling the larvae of psychoda flies, but destroyed other forms of protozoa, as stated by Max Levine and W. W. Frye (Iowa State College).

Treatment of packing-house wastes by super-chlorination at the Hormel packing plant, as described by Professor H. O. Halvorson (University of Minnesota), includes use of sedimentation, chlorination, mixing tanks, secondary sedimentation, sludge filter and drying mechanism. This treatment plant, with a capacity of 1,500,000 gal. a day is now handling 0.75 m.g.d. and using 1,500 to 1,700 lb. of chlorine, obtaining about 5 tons of sludge averaging 8.5 per cent ammonia. The sludge is sold for fertilizer at $20 per ton and animal food may be made from it if the fats are removed. Operating cost of $144.50 daily includes interest and depreciation on $70,000. Deducting the value of recovered products the net cost is about $42 per day, or $56 per million gallons as against $125 for treatment by biological processes.

The complicated problem of sewage treatment for St. Paul and Minneapolis was reviewed by J. A. Childs, chief engineer of the metropolitan sewerage commission. Annual costs would be much less with a joint plant, but the basis of division of cost among the various political divisions and the packing-house companies has not been settled.

Officers of the association for 1931-1932 include: President, L. F. Warrick, chief engineer of State Board of Health, Madison, Wis.; secretary (reelected), Gus H. Radebaugh, Urbana, Ill.

Western Society Confers Honorary Memberships

At the annual meeting and dinner of the Western Society of Engineers, held in Chicago on May 28, honorary membership was conferred upon Dr. Arthur H. Compton, University of Chicago (who was awarded the Nobel prize for physics in 1927), and also upon three past-presidents: William L. Abbott, John W. Alvord and C. F. Loweth.

About 370 members and guests were present. Reports showed the society's financial affairs in good condition. A slight drop in membership occurred, but this was less than had been expected under prevailing circumstances. Attendance at the meetings during 1930-31 was large, reaching a total of 11,978. This was due in part to the series of lectures on different branches of science. It is planned to arrange for similar lectures in the fall. Two other lines of successful activity have been frequent inspection trips and the meetings of the junior members, who have an organization of their own.

Officers elected include: president, Frank D. Chase; vice-presidents, D. J. Brumley, Harry B. Gear and C. C. Whittier; treasurer, Leigh S. Keith. The secretary is E. S. Nethercut. Chairmen elected by the technical sections are the following: bridge and structural, H. H. Cosley; electrical, F. R. Innes; gas, K. B. Nagler; hydraulic and sanitary, A. J. Schafmayer; illuminating, J. C. Herron; mechanical, D. H. Skeen; railroad, V. R. Walling; telephone and telegraph, G. B. West.

The principal speaker at the dinner was Mayor A. J. Cermak, who outlined the plans, promises and prospects of the city's new administration.

Bond Issues Approved in Kansas

Approval of bond issues totalling $39,950,000 was given by voters of Kansas City and Jackson County, Mo., on May 26. The city will expend $32,000,000 for various city improvements including $3,500,000 waterworks improvements; $1,500,000 sewers, pumping station and equipment; $9,500,000 for city hall, auditorium, police and fire stations and $2,000,000 for traffic ways, river control works and parks and playgrounds. Jackson County bonds will finance court houses in Kansas City ($4,000,000) and Independence ($200,000); county roads ($3,500,000), and a $250,000 detention home.

Contracts Awarded for Natural Gas Pipe Line in Montana

Bids on the Montana Power Co.'s natural gas project, which covers the construction of a pipe line from the Canadian border to Butte by way of Helena, Deer Lodge and Anaconda, and from Dry Creek near Red Lodge to Bozeman by way of Big Timber and other towns, were opened on May 20. Eight concerns submitted bids and the contract was awarded to the Winston Bros. Co., of St. Louis, Mo. It was announced that the pipe, much of which will be 28 in. in diameter, will be furnished by the A. O. Smith Co., of Milwaukee, Wis., and that all the welding will be done by that company. No figures were given out as to the amount of the contract bid, but it has been estimated by engineers that the project will cost between $12,000,000 and $15,000,000.

Low-Water Conditions Largely Relieved in the Southeast

Copious rains in the Southeast during recent weeks have largely relieved the low-water conditions that have so long been serious in that section of the country. Present indications are that there will be no shortage of municipal supplies this season. Most of the ponds of the principal hydro-electric developments have filled faster than seemed possible a month ago. Few of them, however, are anywhere nearly up to the desired stages at this time of the year, nor does it appear likely that many of the ponds will be filled before the dry period normally begins in the late summer. But all risk of a shortage of power seems past, unless the rainfall is below normal in the next two or three months.

Miller Memorial Medal Awarded to Eric Harold Ewertz

The board of trustees of the American Welding Society has announced the award of the Samuel Wylie Miller memorial medal for the year 1930 to Eric Harold Ewertz. Mr. Ewertz was a pioneer in the development and application of arc welding, particularly as it applies to shipbuilding.

One of Mr. Ewertz' outstanding performances was in connection with the contract, awarded in 1917, to build a $15,000,000 plant and construct 35 destroyers for the U. S. government, all to be delivered in 27 months. Four months after breaking ground, ship construction was started and in 1918, with thirteen months of the contract time spent, 65 per cent of the contract was finished.

After the war, in December, 1918, Mr. Ewertz took charge as general manager of the Moore plant of the Bethlehem Shipbuilding Corp., Elizabeth, N. J. He resigned in 1928 to establish a consulting welding engineering practice in New York City in order to promote and develop the possibilities of fusion welding in ship construction and steel structures.

Mr. Ewertz was appointed in 1918 a member of the Emergency Fleet Corporation welding committee and was also in charge of all welding development for the Bethlehem Shipbuilding Corp.

Keystone Photo

NEW MOTOR ROADWAY ON MANHATTAN BRIDGE

The new upper deck motor roadway on the south side of Manhattan Bridge, connecting New York City and Brooklyn, will be opened about June 1. With this new roadway, the bridge's carrying capacity will be 95,000 automobiles daily, compared with a capacity of 65,000 previously.

City Engineer for 43 Years

With a record of holding the position of city engineer of Sheboygan, Wis., from 1888 to 1931, Charles U. Boley retired on May 1. Beginning with a city of some 10,000 population, having no sewers or paved streets, Mr. Boley has handled the paving, sewerage, water supply and other municipal developments for a 43-year period, during which the population has increased to more than 40,000.

Reorganization of U. S. Office of Indian Affairs Announced

Complete reorganization of the office of Indian Affairs is announced by the secretary of the interior. Five field divisions, health, education, agricultural extension and industry, forestry, and irrigation, have been organized with a technical or professional director at the head of each division. The director of irrigation is William S. Post, who was appointed on Jan. 20 of this year. Mr. Post is well known in the field of hydraulic engineering in the Pacific Coast states, and was for some years with the U. S. Geological Survey. The director of forestry is J. P. Kinney, who has been in the service since 1910 as chief forester.

Los Angeles to Build Village for Olympic Contestants

Plans for "Olympic Village," to be constructed near Culver City, Calif., to house participants in the 1932 Olympic games, are being made in Los Angeles, although actual construction will not begin until next spring. The village, which will cost $500,000, will be erected on an oval plan with 1,000 individual houses, an administration unit and a dining hall.

H. O. Davis has been appointed director of construction of this project by the Olympic games committee.

Clements Nominated by A.S.T.M.

F. O. Clements, technical director of the research laboratories of the General Motors Corp., Detroit, has been nominated for president of the A.S.T.M. for the year beginning with the annual meeting, June 23. Other nominees are: for vice-president, S. T. Wagner, consulting engineer of the Reading Co., Philadelphia; for members of the executive committee, Arthur W. Carpenter, manager of technical laboratories of the B. F. Goodrich Co., Akron; K. B. Cook, technical manager of Manville Jenckes Co., Pawtucket; J. B. Johnson, chief of the materiel section of the Army Air Corps, Dayton; G. C. D. Lenth, secretary of the Clay Products Association, Chicago; O. L. Moore, engineer of tests of the Universal Atlas Cement Co., Chicago.

For the first time in the history of the society an exhibit of testing apparatus and machines will be held in connection with the society's annual meeting. This will be located in the exhibition hall of the Stevens Hotel, Chicago, where the meeting takes place.

U. S. Public Building Program Includes 758 Projects

In a recent statement issued by President Hoover it is revealed that the government public building program includes 758 building projects, to cost $452,519,240.

During the past two years 51 projects have been completed, with total limits of cost for land and buildings of $23,316,876. At present sites have been acquired and contracts have been let either in whole or in part and construction is in progress for 150 projects, to cost, for land and buildings, $120,213,900. Plans have been completed for 56 projects, to cost $20,097,000. Specifications are now being prepared for about half this number, and the remaining projects are on the market for construction bids. Sites have been acquired for 190 building projects and plans for these are partly completed, the total cost being $192,173,723. Sites for 115 projects have been determined and have recently been acquired or are in course of negotiation or condemnation, cost for land and buildings being $50,622,941. About 196 projects have been specifically authorized by Congress and the sites are in the process of selection.

New Car-Ferries on Lake Michigan

That the Pennsylvania Railroad is planning to establish a car-ferry line across Lake Michigan in order to provide a shorter and more direct freight route between eastern points and the northwest was announced recently by Elisha Lee, vice-president, in an address to the Transportation Club of Muskegon, Mich. This city is a terminal point on the Pennsylvania system and has been adopted as a car-ferry port by the Grand Trunk Railway, which enters Muskegon over the Pennsylvania line from Grand Rapids. At present the Grand Trunk operates between Grand Haven and Milwaukee, but new ferry-landing facilities are near completion at Muskegon, and it is expected that the transfer from Grand Haven will be made next summer. The Pennsylvania purposes to run its boats from Muskegon to Milwaukee and perhaps also to Manitowoc, Wis.

Fixed or Draw Bridges for Chicago River

At a public hearing as to bridge clearances held in Chicago by a special board of the U. S. Engineers, fixed bridges for the Chicago River were advocated by A. J. Hammond, consulting engineer, who considered that large vessels should go to the proposed harbor in Lake Calumet for interchange of freight with barges of the lake-to-gulf waterway. This view was indorsed by W. A. Rowan, chairman of the council committee on harbors. A similar opinion was expressed by R. W. Putnam, consulting engineer, with the modification of proposing a main barge terminal at Joliet, Ill., whence freight would be distributed to the Lake Calumet harbor and a Chicago barge terminal. On the other hand, Col. Weeks, U. S. district engineer at Chicago, considered that lake vessels should be able to go through the river and the drainage canal to Joliet. Another hearing will be held in regard to railway bridges.

Work Under Way on Large Texas Irrigation Project

The Texas state board of water engineers, after a delay of two years, has approved plans for the construction by the Willacy County Water Control and Improvement District No. 1 of the first large irrigation district in the lower Rio Grande Valley to have a storage reservoir in which to impound floodwaters for irrigating its lands. Water will be pumped from the Rio Grande at the west line of Cameron County and will flow 27 miles northward to a large storage reservoir holding 75,000 acre-ft. of water. From the reservoir fourteen main canals will lead into all parts of the district, serving water to the land through 560 miles of concrete-lined canals and underground concrete pipe. The district to be irrigated will embrace 180,000 acres. The project will cost $7,500,000 when completed.

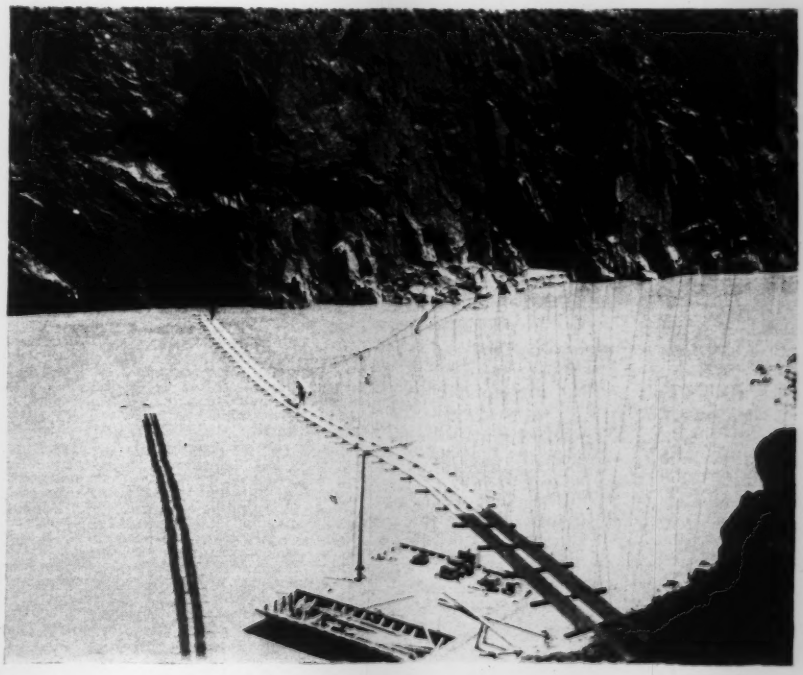
Construction work on the intake canal from the Rio Grande to the storage reservoir is now under way and the first units of the reservoir are completed. R. B. Brier, of the Morgan Engineering Co., Memphis, Tenn., is project engineer for the district.

Hoover Dam Notes

From Victorville, Calif., to Hoover Dam the new 132-kv. steel tower line of the Southern Sierras Power Co. is completed. Finishing touches are being put on the construction of the substation at the dam site and work is being rushed on the line from Victorville to San Bernardino, Calif., to complete the entire job and test it some time shortly after June 1. Work was started on the 193 miles of line from the Victor substation on Jan. 1, 1931. On April 25 it was tied in at the substation at the dam site. Work was well organized, with four camps serving the crews. Three camps were in operation, with a fourth camp moving to the next location. Besides these were crews of men drilling the rock holes preparatory to the arrival of the erecting crews. The line is a steel-tower, single-circuit line which will be operated at 88 kv. during the construction work and then will be used to feed back from the Hoover Dam power house at 132 kv.

Though work could not start on the substation until a roadway was constructed to the dam site itself, and that construction did not begin until March 23, the substation will soon be ready for test. From the roadway the Southern Sierras company had to built 1¾ miles of road through solid rock to reach the substation site. June 25 has been set as the deadline for the operation, but it is expected the line will be tested far in advance of that time. At the substation voltage will be stepped down to 2.2 kv. for operations at the dam and to 3.3 kv. for distribution to the town 7 miles away.

The 32-mile line connecting the San Bernardino plant with the Victor sub-



Bridging the Colorado at Hoover Dam
Footbridge built by Six Companies, Inc.

station, 5 miles out of Victorville, is also nearing completion. This line is being built over the the San Bernardino Mountains.

At the San Bernardino plant a second 15,000-kw. condenser with transformer equipment is being installed to take care of the new load. Service for Boulder Dam will come off the main buses of the company's system at the San Bernardino plant.

The adit in the Arizona abutment to reach the diversion tunnels had been driven 160 ft. by May 23. Preparations have been made for similar excavation in the Nevada abutment.

Difficulties are being encountered in excavating heavy rock for the Boulder City-Hoover Dam highway, but the other parts of the work are progressing on schedule.

Wage Law on Crossing Work Upheld by N. Y. Court

Constitutionality of the Dunmore labor law requiring an eight-hour day and the payment of "prevailing wage rates" on grade-crossing elimination projects, enacted by the State of New York in 1930, was affirmed by the state Court of Appeals in a unanimous decision rendered June 2. The railroads had attacked the validity of the law on the grounds that it interfered with interstate commerce and that its provisions were too vague for accurate determination of wage payments. The law does not apply to railway employees, according to the court, but only to contractors' forces.

The decision states that grade separation is not, in itself, interstate commerce, and that since the railroads have elected to accept the benefits of state funds for such work, they must subject themselves to state supervision in respect to hours and wages. The contention that the law is vague is dismissed with the comment that "when reliable data have been obtained, the prevailing rate can be calculated with exactness."

Safety of Cobble Mountain Dam Upheld in Report

In a report presented on June 1 the adequacy of design of the Cobble Mountain Dam, now under construction as part of the water supply system of Springfield, Mass., was fully upheld by an engineering board consisting of Charles T. Main, X. H. Goodnough and J. Waldo Smith. This board had been appointed by the commissioners of Hampton County, at the request of the city of Westfield, eight miles below the structure, to report on the possibility of a failure.

The structure, designed by the late Allen Hazen, will be the highest earth dam in the world, extending 250 ft. above rock. Of the estimated content of 2,000,000 cu.yd. of material more than 60 per cent has been placed by the full hydraulic method.

WASHINGTON NOTES

By PAUL WOOTON
Washington Correspondent

Government Contract Study to Be Limited—President Upholds Wages—Technological Changes

NO EXPLANATION has been given by the Federal Trade Commission for ignoring in its investigation into the letting of contracts for construction of government buildings the section of the Senate resolution which instructs the commission to determine whether there has been any collusion between manufacturers and suppliers of building materials and officials or employees of the Treasury Department in connection with specifications for construction. The investigation will be confined to determining whether or not there have been any agreements among the manufacturers of building materials relating to the prices or other terms under which the materials are furnished to contractors or bidders. The Senate resolution, which was sponsored by Senator Shipstead, instructs the Commission to submit the results of its investigation to the Senate and to the Department of Justice on or before Dec. 7.

Railway Wage Rates

Delay at the White House in making public the report of the emergency arbitration board in the Louisiana & Arkansas Railway wage dispute indicates that the board's recommendation involves a reduction in wages. The board, of which Judge Charles Kerr is chairman, has submitted its report to President Hoover but the latter has announced that it will not be released until he has had an opportunity to confer with the members of the board and the executives of the railroad.

Although the L. & A. controversy is of relatively little significance, it has placed the administration in a predicament that calls for the exercise of considerable discretion. A report from a board appointed by the President recommending a wage cut, might be interpreted by the public as a retreat by the administration from its policy of insistence upon the maintenance of wage scales.

Study Baton Rouge Bridge

A special board of engineer officers will be appointed to consider the condition under which a permit will be issued for a bridge over the Mississippi River at Baton Rouge, La. It is planned to have the board conduct hearings in the near future to develop all of the necessary information, as a controversy of considerable magnitude has arisen over the project. The permit is being sought by the Missouri Pacific and the Louisiana & Arkansas Railroad companies but, as the structure will be used for vehicular traffic as well, the Louisiana Highway Commission has agreed to contribute $2,500,000 to the cost of construction

The applicants want to build a structure with a vertical clearance of 65 ft. This is being vigorously opposed by the people of Natchez, who want the river developed so as to make it possible for ocean-going ships to use the river above Baton Rouge.

Machine-Displaced Labor

A three-cornered attack on the problem of technological unemployment was developing in Washington this week. Organization of a committee to study this subject by Secretary of Labor Doak has been completed. L. W. Wallace, executive secretary of the American Engineering Council, has been invited by Senator LaFollette to serve on a committee being organized by the progressives to study ways and means of compensating for the continued displacemen of men by machines. If Mr. Wal-

SOCIETY CALENDAR

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York; summer meeting, Tacoma, Wash., July 8-10.

AMERICAN SOCIETY FOR TESTING MATERIALS, Philadelphia; 34th annual meeting, Chicago, June 22-26.

BUFFALO SECTION, American Society of Civil Engineers, has elected the following officers: president, Townsend S. Carpenter; vice-president, Nathan S. Sturdy; secretary, Roswell S. Buck.

ENGINEERING SOCIETY OF BUFFALO has elected officers as follows: president, Newell L. Nussbaumer; vice-president, Gideon W. Swan; secretary, Calvin C. Bishop; treasurer, Bert A. Hansen.

NATIONAL ASSOCIATION OF RAILROAD TIE PRODUCERS at its annual meeting at West Baden, Ind., in May, elected officers as follows: president, E. E. Pershall, president of the T. J. Moss Tie Co., St. Louis, Mo.; vice-presidents, S. S. Watkins, Chicago, and B. N. Johnson, Richmond, Ind., secretary (reelected), Roy M. Edmonds, St. Louis, Mo.

NEW YORK SECTIONS, American Society of Civil Engineers, American Water Works Association and American Welding Society, will hold a joint meeting in New York City on June 9. The tentative program includes papers on "Welding Cast-Iron Pipe," by T. W. Greene, development welding engineer, Linde Air Products Co.; "Modern Electric Resistance Welding of Pipe," by J. S. Adelson, chief metallurgist, Steel Tubes, Inc., and L. B. Grindlay, manager, metallurgical department, Youngstown district, Republic Steel Corp.; "Arc Welding Large Diameter Pipe for Water Distribution," by Vincent P. Marran, Holyoke Steam Boiler Works, Inc.

THE SANITARY GROUP of the Los Angeles Section, American Society of Civil Engineers, at its May meeting, the last before the summer recess, heard the following speakers: G. T. Luippold, manager, Wallace & Tiernan Co., who discussed "The Ammonia Chlorine Treatment of Water"; J. C. Albers, city engineer, Glendale, Calif., whose topic was "Recent California Sanitation Legislation"; and Walter D. Smith, assistant engineer, Los Angeles City Engineer's office, who spoke on "Sewage Irrigation in Southern California."

SOCIETY OF ENGINEERS OF EASTERN NEW YORK, composed of civil, mechanical engineers in Albany, Schenectady, Troy and vicinity, has elected officers as follows: President, Lewis B. Sebring, Schenectady; vice-president, Claude C. Nuckols, Albany; treasurer, Henry V. Bohn, Schenectady; secretary, Arthur Bibb, Troy. The society, which has functioned for more than 27 years, now has a membership of about 400.

TACOMA SECTION, AMERICAN SOCIETY OF CIVIL ENGINEERS, held its regular monthly meeting May 11. The principal speaker was Harry P. Hart, of Seattle, Northwest representative of the Pomona Pump Co., whose subject was "Sidelights on Engineering Experiences in China."

lace consents to serve it will be a rather positive indication that the administration is interested in giving some direction to the program that the progressives are planning to frame. A committee of the American Engineering Council recently appointed for the purpose of studying measures for balancing the forces of production, distribution, and consumption also expects to proceed, independently of the other organizations, with a study of the bearing that technological unemployment has in this broader field.

Personal Notes

E. E. TANNER, of Watertown, N. Y., has been made supervisor of bridges and buildings of the Adirondack division of the New York Central Railroad.

JOHN O. BLACK, of Kingston, Ohio, has been appointed surveyor of Ross County to succeed the late Ben Walker. Mr. Black has served for two years as division engineer in charge of maintenance.

R. M. GREGORY, for the past several years assistant city manager and street superintendent of San Diego, Calif., has been appointed city manager of San Diego. Mr. Gregory succeeds F. M. Lockwood.

L. M. BUSH has been appointed city engineer of Oklahoma City, Okla., succeeding George F Brown, resigned. Mr. Bush is a graduate of the engineering department of the University of Kansas and for the last ten years has been with the engineering firm of V. V. Long & Co.

GEORGE F. FISK, formerly commissioner of public works in Buffalo, N. Y., who retired recently after more than 25 years' service in the department, has opened an office in Buffalo for consulting practice, specializing in municipal engineering problems.

FRANK C. BARR has been appointed to take charge of the pipe-line department of the Hoosier Engineering Co., Chicago, erector of substations and electric, gas and oil transmission lines. Mr. Barr has been engaged in pipeline construction, operation and maintenance for more than twenty years.

FREDERICK M. FEIKER, formerly editorial director and vice-president of the McGraw-Hill Publishing Co., and lately managing director of the Associated Business Papers, has been designated by President Hoover as director of the Bureau of Foreign and Domestic Commerce of the U. S. Department of Commerce.

FRANKLIN THOMAS, professor of civil engineering at the California Institute of Technology, Pasadena, Calif., and a director of the Metropolitan Water District, has been appointed by Los Angeles County to check plans prepared for Big Tujunga Canyon by the flood-control district. The proposed flood-control program consists of three dams in addition to the one just completed.

LYTLE BROWN, Major General, U. S. Army, has received an honorary doctor's degree from the Michigan College of Mining and Technology. General Brown made the class day address at the commencement exercises.

The Business Outlook

The week-to-week change in the composite picture of production, construction and trade activity continues small, confirming the increasingly clear conclusion that business has reached its resistance level. The first three weeks of May show a slight shading off from the spring peak of the preceding two months, but the full April records clinch the evidence of improvement in fundamental factors since the beginning of the year. Production volume has increased slowly for four successive months, supported especially by lines involving consumer rather than capital goods. Trade volume, as reflected in department store sales, bank debits and merchandise car loadings, shows a definite rise in April. Business failures have apparently passed their peak, as they always do when business volume begins to increase. Construction is the conspicuous laggard and is depressing steel despite encouragingly steady automotive activity.

—The Business Week, June 3, 1931.

Obituary

GUSTAVE ROBITSCHER TUSKA, of New York City, committed suicide by shooting on May 28 because of despondency over illness. Mr. Tuska, who was 61 years old, was graduated from the College of the City of New York in 1888 and in civil engineering from Columbia in 1891. After a short period as engineer and draftsman with the Link-Belt Co., Philadelphia, and as bridge engineer with the Long Island R.R., he became an instructor in the department of civil engineering, school of mines, Columbia University. From 1896 to 1899 he was chief engineer of the Panama Railroad Co. Of late years he was in private practice as consulting engineer on water-power plants, railroads and piers. During the World War, in which he rose to be a lieutenant colonel, he worked with the director general of military railways. He was a member of the American Society of Civil Engineers.

GORDON S. STAYMAN, commissioner of public works of the village of Peekskill, N. Y., from 1928 to 1930, died on May 17, at the age of 60. Mr. Stayman before going to Peekskill was employed as an engineer on construction work by several railroads, including the Reading, the Erie, the Lehigh & New England, the Chicago, Milwaukee & St. Paul, and the New York Central.

THOMAS L. BOYLE, general superintendent of construction of the water department of Kansas City, Mo., died on May 18 at the age of 56. Mr. Boyle was a member of the American Water Works Association.

Public Work Active Everywhere; Building Volume Small

A SURVEY of the construction situation in many cities and states shows that public works are being pushed according to expectations but that building volume is at the lowest level in years. The money value of all contracts let this year is 19 per cent below that of last year; in view of lower bid prices probably 20 per cent below 1930 on the average. The actual structure volume represented by the contracts is about the same as that of last year. Apart from sustained public-works activity, the most hopeful sign is the comparative strength in residential building volume. While total building volume is only about half that of last year, the drop in dwelling-house construction amounts only to 11 per cent in money value, representing slightly greater structure volume than 1930.

In New England wholehearted support of unemployment programs has produced quite a revival in construction and induced optimism in contracting circles. Municipal projects are in greater volume than in other years. Public work, in fact, is 34 per cent heavier in volume than in 1930, and this has caused total construction to drop only 7 per cent below last year despite a 37 per cent decrease in building. Construction in Boston is 25 per cent below that of last year, but architects and other news sources on early proposed work report an improved outlook. Contractors also are hopeful.

In the Middle Atlantic states private construction totaled $267,000,000 compared with $343,000,000 a year ago, a drop of 28 per cent, and public works totaled $196,000,000 compared with $238,000,000, a drop of 22 per cent. In Albany, no branch of construction is active; dwelling houses show half the volume of a year ago and the value of all building permits is 13 per cent lower. Volume in Syracuse is the same as last year due to more state work. Building is increasing in Rochester and the 1931 program is $12,000,000. Conditions are better in Utica, Watertown, and other northern New York cities, with residential building lowest and public building leading.

Construction in New York City shows signs of great improvement, particularly in residential building. A check-up of

OFFICIAL AND ACTUAL WAGES OF BUILDING MECHANICS IN 20 CITIES

	Carpenter		Bricklayer		Plasterer		Ironworker		Common Labor	
	Scale	Paid	Scale	Paid	Scale	Paid	Scale	Paid	Scale	Paid
Albany	1.375	1.00–1.25	1.75	1.25	1.75	1.25	1.25	....	....	....
Atlantic City	$1.50	$1.00	$1.75	$1.75	$1.00–$1.25	....	$1.65	$1.00	$0.75	$0.45
Birmingham	1.00	0.55	1.50	0.80	1.25	0.75	1.50	0.85	....	0.30
Canton	1.25	0.75–1.25	1.50	1.50	1.75	1.50	1.25	1.00	0.50	0.40–.60
Duluth	0.90	....	1–1.30	....	1.30	....	1–1.25	....	0.50–.65	....
Ft. Worth	1.125	....	1.625	....	1.75	....	1.25	....	....	0.25–.30
Hartford	1.25	0.90	1.50	1–1.122	1.50	1.00	....	....	0.50	0.50
Kansas City	1.375	....	1.50	....	1.625	....	1.375	....	.825	....
Knoxville	0.875	0.40–.50	1.25	0.80–1.00	1.25	0.80–1.00	0.85	0.80	0.30	0.15–.30
Memphis	0.50–1.00	....	1.625	....	1.56	....	1.25	0.875–1.00	0.20–.30	0.20–.30
Minneapolis	0.90–1.00	0.875	1.30	1.125–1.375	1.30	1.125	1.00–1.25	....	0.50–.65	0.40
Montgomery	....	0.30–.75	....	0.50–1.00	....	0.50–1.00	....	0.75–1.00	....	0.15–.25
Muskegon, Mich.	0.75–.95	0.70–.90	1.55	1.50	1.05	1.00	....	....	0.40	0.35
Peoria	1.20	1.20	1.50	1.50	1.50	1.50	1.25	1.25	0.75	0.75
Philadelphia	1.25	0.90–1.00	1.75	1.50	1.625	1.25–1.50	1.75	1.375	0.40	0.40
Richmond	0.90	0.50–.70	1.50	1.00	1.25	0.85–1.00	1.50	0.70–1.00	0.20–.40	0.20
Rochester	1.20	1.265	1.50	1.58½	1.50	1.58½	....	....	....	....
St. Louis	1.50	1.50	1.75	1.75	1.75	1.75	1.75	1.75	0.875	0.875
Trenton	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	0.40	0.40
Average	$1.15	$0.97	$1.54	$1.32	$1.47	$1.22	$1.37	$1.13	0.54	$0.38
Below scale		16%		14%		17%		18%		30%

residential projects that were contemplated during the last 18 months but did not go through shows bids being taken on some of them and contracts being let on others.

Philadelphia building permits for the first four months totaled $10,432,000 compared with $23,540,000 in 1930, with no improvement seen before fall. On the other hand Pittsburgh reports excellent conditions: Allegheny County work is in large volume.

In the South construction is 10 per cent ahead of last year because of a doubling in public-works volume. In 1930 private and public works were evenly divided, totaling 56 and 58 millions respectively, while this year the totals are 24 millions for private and 102 millions for public.

Charleston, W. Va., reports state road work and industrial building active. Richmond reports improvement in many lines, with only residential building below last year and public-utility work about the same as in other years. State highway work for the first six months will total $10,000,000, or more than for the first half of 1930. In Knoxville building has stopped but there are three sewer projects and a bridge under way totaling $1,500,000. Construction is slow in Memphis due to a depressed lumber market and over-building in the last few years; outlook improved. Louisville reports only 60 per cent of the volume of a year ago. In Birmingham activity is greatest in public-works, next in industrial. In Louisiana additional federal funds have increased highway construction over last year. In Tallahassee public and residential building is normal, but industrial building is small.

Middle West public construction is 6 per cent ahead of last year; private 39 per cent below. In Ohio building is quiet but dwellings are expected to equal last year's volume, and generally greater activity is expected in the second half of the year. Public improvement has been hampered by a recent decision of the state supreme court holding that an entire county could not be taxed for a local improvement. Cincinnati building in the first four months of 1931 totaled $6,000,000 compared with $18,000,000 last year, but public-works volume is the same as last year and residential building is most active. Cleveland issued building permits for $7,000,000 in the first quarter, against $11,000,000 in the same period last year. Work valued at $2,000,000 is held up pending decision on whether or not the city as a whole may share in the cost of paving or sewer improvements. Akron improvements total only $500,000 compared with three times, that amount last year.

Industrial building in Chicago is practically at a standstill, many factories are for sale and it is cheaper to rent than to build. The drop in residential building is shown by these figures: first quarter of 1931, permits for 221 single-family dwellings and 120 apartments; first quarter of 1930, 231 single-family dwellings and 488 apartments. At the head of the Lakes construction is about the same as it was a year ago but much below 1929. In Detroit residential building is the only active branch of construction. The city's construction budget has been reduced from several millions to $400,000.

In the great region between the Mississippi River and the Rocky Mountains and from Canada to Mexico, construction is only 6 per cent below last year's volume. Public works total $110,000,000, last year $116,000,000. Private construction total $84,000,000 compared with $90,000,000. In South Dakota federal, state and municipal work is universally active, with state highway construction 36 per cent above the level of other years. Outlook is better for both industrial building and municipal public work.

In Sioux City industrial building is below last year, with commercial and public works the same and residential building very active. Wyoming state highway volume is larger than last year. In Pueblo and southern Colorado public-works construction is in larger volume than last year, with highway work 40 per cent larger, public buildings 20 per cent and sewers and waterworks the same as last year. In Kansas there is twice the volume of highway work under way as there was last year; residential and commercial building half last year's volume. In St. Louis building permits are above last year's figures due to several unusually large projects.

Oklahoma reports depression due to the droughts of 1930, stagnation in the petroleum industry, and the business slump. Money rates are high and there is no market for bonds for public works. Home building in San Antonio below last year's volume; costs are 12 to 20 per cent below those of 1929 and early 1930. Industrial work is more active than last year. Municipal construction is small, but the federal government has $12,000,000 worth of work under way. Public utilities are up to 1930 volume, and irrigation work is particularly heavy. In Amarillo volume is better than last year, and bankers and business are optimistic. A heavy wheat crop is expected to boom the Panhandle.

Construction in the Far West records a gain over last year's volume because of the inclusion of the Boulder Dam contract. With this contract the public works total is $95,000,000, compared with $53,000,000 in the first five months of 1930. Private construction totals $49,000,000 compared with $89,000,000 last year. In Idaho only road work is active. In Nevada road work is up to last year's volume. Other construction, except for some federal work, is inactive. In Utah both public roads and building are larger than last year. In Arizona road construction is up to last year's volume, other classes below. In the state of Washington building is lowest in twelve years, but the largest public-works program in history is under way. The state highway department plans to spend $14,000,000 in the next nine month and the legislature has appropriated $26,000,000 for road work in the next two years. Engineers and architects of Portland, Ore., report many inquiries and new work. Public work in the state is heavy, especially county work.

San Francisco in the first quarter issued permits to the value of $5,600,000, compared with $6,100,000 for the same months of 1930. Home building is most active in the city and throughout the state. Federal projects include a $5,000,000 dirigible base, an air base, a bombing base and post offices for Oakland, San Francisco, Sacramento and Stockton to cost $7,000,000. In Los Angeles, building permits for the first quarter amounted to $11,700,000 against $20,059,000 a year ago.

Construction Equipment and Materials

Five Hard-Surfacing Products

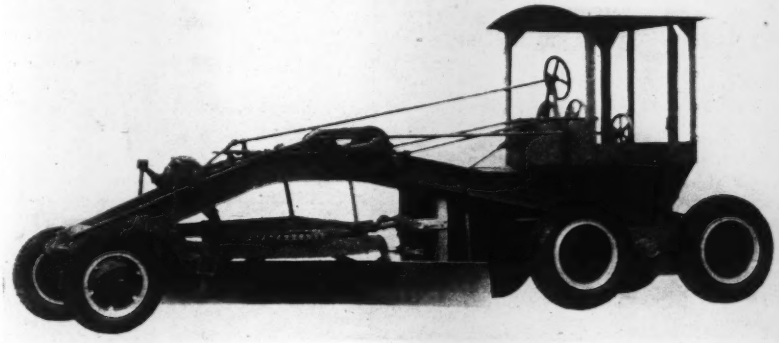
A group of five new hard-facing products for application on friction surfaces has been developed by the Armite Laboratories, 318 West Ninth St., Los Angeles, Calif. These are for application with the electric arc and by the oxyacetylene method, and include several grades of inserts and compounds, ranging in size from the 20-mesh to ½-in. diameter, for application to drilling bits, power shovel teeth and for other services. The company has also developed a new tungsten carbide compound that can be applied direct to any type of steel and, by special application, to manganese. This product, Armite Arcweld, is applied with an electric arc using a negative carbon electrode. The same material in tube form, known as Armite Autoweld, is also being introduced. The laboratory, in addition to manufacturing materials of diamond-like hardness, has also developed a hard-facing rod claimed to be of lighter weight than rods heretofore placed on the market so that more surface is covered per pound. This hard-facing rod is made in three grades of varying hardness.

Motor Grader Propelled by Four Drive Wheels

Better traction on soft or muddy surfaces is assured in the new tandem drive motor grader announced by the J. D. Adams Co., Indianapolis, Ind., because the weight and power of the tractor unit are distributed over four wheels instead of two. This unit can be furnished with McCormick-Deering, Allis-Chalmers or Case power units equipped with either solid or penumatic tires. Other models are available with steel or rubber crawlers.

The tractor unit is so attached to the grader frame that a considerable part of its weight is effective on the blade. All drive chains, sprockets and bearings are completely inclosed in dirtproof housings, greatly increasing the life of all these parts. As the four drive wheels pivot about the tractor rear axle, each carries its fair share of the weight. Each drive wheel is driven by a separate roller chain, and the tractor and wheel axles are mounted on ball and roller bearings. All-welded construction is now utilized on this and other Adams motor graders.

Pneumatic tire equipment for the tandem drive unit is 40x8-in. twelve-ply heavy-duty tires furnished with puncture-proof tubes, which are said to eliminate tire trouble.

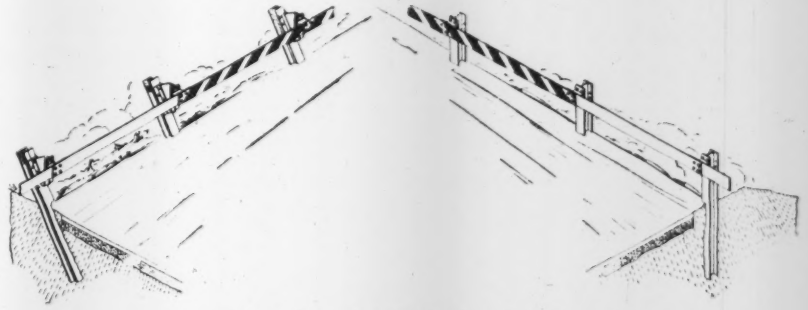


Tandem motor grader with pneumatic tires

A.I.S.C. Designs a Road Guard

Patent claims have been filed by the American Institute of Steel Construction, 200 Madison Ave., New York City, on a road guard which it has designed consisting of steel plates bolted to steel columns or posts. This action has been taken to insure use of the design by all fabricators and erectors without fee. This is the second time the Institute has filed patent claims for improvements in steel construction, the first applying to the battledeck type of floor construction.

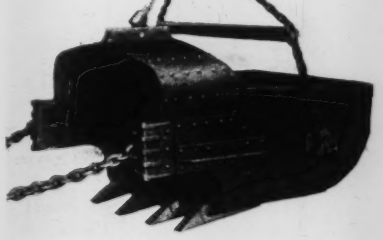
The new road guard is said to have several advantages, including a solid and substantial appearance and strength sufficient to deflect traffic back into the roadway and to prevent a car from leaving the road. Posts, consisting of 6-in. steel H-columns, are driven into the ground with a light portable pile-driver in either a vertical or inclined position, according to ground conditions. In either case there is a bracket that carries the steel plate far enough away from the post to prevent impact against the post itself. The plates are 8 in. wide and ¼ or ⅜ in. thick, and are located above the center of gravity of the average automobile to prevent overturning. The open space below the plates permits snow to blow off the roadway instead of forming drifts.



Inclined and vertical installation of road guard

Dragline Bucket Improved

Improvements in design, eliminating all unnecessary weight, have enabled the Erie Steel Construction Co., Erie, Pa., to announce a new dragline bucket that is light in weight, yet sturdy in construction. Many new features are claimed by this manufacturer. The bridge of the bucket ties in with the lip and side plates to keep the sides from pulling in. Hitch plates are heavy steel castings overlapped by reinforcing plates and angles, and are interlocked with the base of the bridge and the ends of the lip. Corner connections are flanged to obtain the maximum strength. A one-piece back band is tied into the bridge and welded and riveted to the side plates. All rivets are machine driven for tightness and rigidity. By locating the center of gravity of the bucket with relation to the hoist trunnion bracket so that in all stages of



Dragline bucket of new design

(Continued on p. 950)

Current Construction Unit Prices

Cobble-Filled Bulkhead at Trenton

A BULKHEAD 1,200 ft. long is being built in connection with the Trenton, N. J., municipal terminal. The work is along the Delaware River and includes dredging 50,000 cu.yd. and making 8,500 cu.yd. cobble backfill. Proposals were requested as follows:

Bulkhead Proper—Lump sum for bulkhead complete except portion over outfall pipe, including dredging and cobble backfill.

Bulkhead Over Outfall—Lump sum for bulkhead, including steel sheetpiling around crib and across rear.

Dredging—Cubic-yard price measured in cut.

Cobble Backfill—Cubic-yard price measured in trucks or on scows at the site.

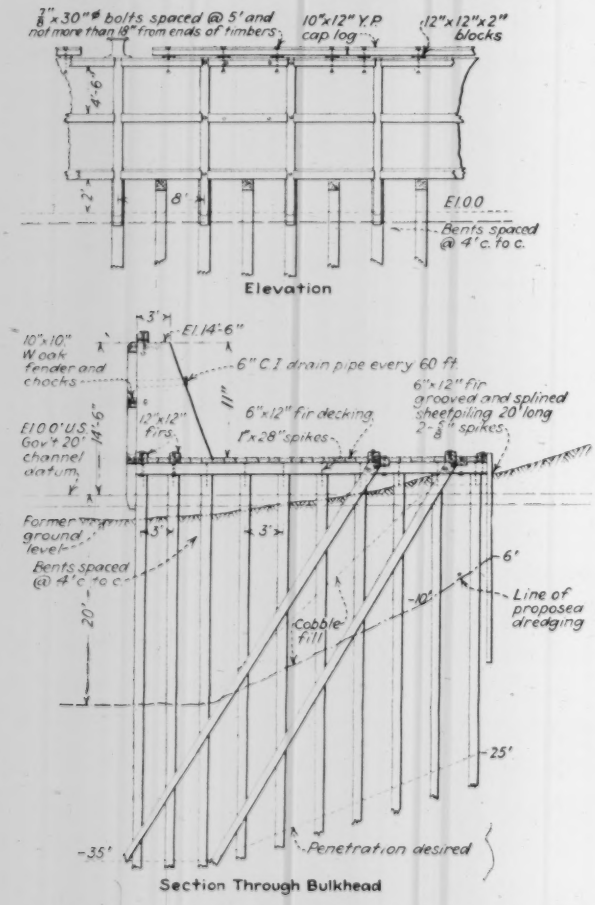
Prices were also requested on the materials items listed herewith for use in making minor changes and to facilitate monthly estimates. The complete list of contract prices is given as submitted by the Karno-Smith Co., Inc., Trenton. Contract price is $166,325. J. W. Thompson is consulting engineer.

Type of construction is shown in the drawing. Bearing and spur piles are Southern pine or oak, 14-in. at 2 ft. from butt and 6-in. at point. Penetration is shown in the drawing. Fender piles are of white oak. Twenty mooring posts weighing 1,150 lb. each are placed at 60-ft. intervals. Class A concrete is 1 : 2 : 3 mix; class B is 1 : 2 : 4. Cobble backfill is obtainable from city property within 1,000 ft. of the lower end of the bulkhead.

The dredging work is to facilitate driving piles and is by the hydraulic method. It includes removal of an old timber wharf and all material except rock requiring blasting.

Decking is of 6x12-in. fir in 16-ft. lengths, with both edges dressed and laid close. Openings are left for placing the cobble fill around the piles.

Concrete work consists of a face wall along the river side and ends of the bulkhead, girder footings, reinforced slab on top of the girders, and incasement of the girders. Slab and incasement are class A, 1 : 2 : 3, and the wall and footings class B, 1 : 2 : 4. All exposed surfaces of the encasement are given two coats of Inertol.



Construction of bulkhead for Trenton municipal terminal

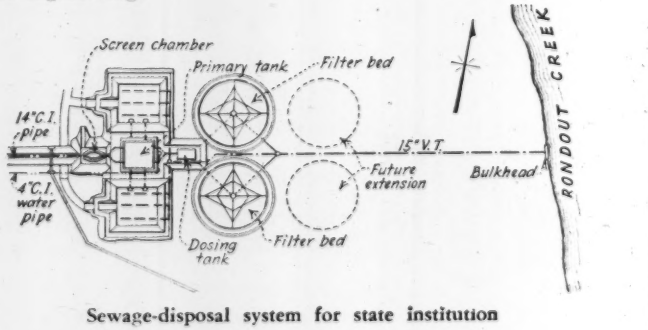
CONTRACT PRICES OF TRENTON BULKHEAD

Bulkhead complete, except for items below	$118,000.00
Bulkhead over outfall pipe	17,000.00
50,000 cu.yd. dredging @ $0.55	27,500.00
8,500 cu.yd. cobble backfill @ $0.45	3,825.00
Total price	$166,325.00
Unit Prices for Extras:	
Vertical piles, each	$15.00
Spur piles, each	19.00
White oak fender piles, each	32.00
Pine lumber, per M ft. b. m.	120.00
Fir lumber, per M ft. b. m.	60.00
Fir sheetpiling including splines 6x12 in. per lin.ft.	7.00
Oak lumber, per M ft. b. m.	75.00
Steel sheetpiling, per ton	80.00
Structural steel, per ton	80.00
Tie rods, per lb.	10
Hardware, spikes, bolts, per lb.	05
Rein. steel, per lb.	06
Concrete, class A, per cu.yd.	10.00
Concrete, class B, per cu.yd.	9.00
Conduit, 2-in., per lin.ft.	50
Conduit, 1-in., per lin.ft.	20
Receptacle boxes, each	3.00
Bitts, complete, each	140.00

Sewage Plant at Napanoch, N. Y.

A SEWAGE-DISPOSAL plant and outfall sewer costing $50,000 will be built at the institution for defective delinquents at Napanoch, N. Y. Work includes a primary tank, sludge-storage beds, filter beds and a 14-in. cast-iron outfall, as shown in the drawing. Excavation is of all classes. The embankment for the sludge-storage bed and around structures and pipe must be free of perishable matter and stones more than 6 in. in diameter. Class A concrete is 1 : 2 : 4; class B, 1 : 2½ : 5. Cast-iron pipe is bell-and-spigot and flanged types in 12-ft. sections; water pipe is class C, sewer pipe is class A. Joints are lead. The nine manholes are brick or concrete with concrete bottoms. The concrete chipping item is for making a hole in an existing concrete wall. The 2,100 cu.yd. broken stone or gravel is for placing in the sprinkler beds, under the floors of the primary tanks and in the sludge beds. Run-of-bank gravel is for under the dosing and screen chambers.

Thirteen bids were received and unit prices are given of the lowest three: A, Marasco Construction Co., 510 W. Eighteenth St., Erie, Pa., $49,894; B, W. L. Lose, Tonawanda, N. Y., $52,779; C, George I. Cubler, Jenkintown, Pa., $53,275. T. F. Farrell is chief engineer, state division of engineering.



Sewage-disposal system for state institution

	A	B	C
6,000 cu.yd. excav.	$0.50	$0.66	$1.15
2,800 cu.yd. embank.	.50	.20	.30
830 cu.yd. 1st class conc.	18.00	17.42	17.00
90 cu.yd. 2nd class conc.	15.00	16.77	15.00
73,000 lb. reinf.	.045	.045	.04
1,200 sq.yd. steel fabric reinf.	.30	.65	.30
64 tons c.-i. pipe	55.00	51.74	42.50
5 tons c.-i. pipe specials	140.00	145.60	130.00
Laying C.-I. Pipe:			
1,300 ft. 4-in.	.25	.26	.25
210 ft. 8-in.	.50	.39	.36
300 ft. 10-in.	.50	.52	.42
30 ft. 12-in.	.50	.58	.50
580 ft. 14-in.	1.00	.65	.60
120 ft. 16-in.	1.00	.97	.80
30 ft. 20-in.	2.00	1.30	1.50
36 ft. 24-in.	.....	.....	.....
Furnishing and Laying Vit. Tile:			
370 ft. 4-in.	.30	.18	.25
130 ft. 6-in.	.30	.27	.30
135 ft. 8-in.	.30	.43	.45
90 ft. 10-in.	.50	.60	.70
1,270 ft. 15-in.	1.00	1.12	1.00
6,200 ft. 12-in. half tile	.35	.36	.40
9 manholes 10 ft. deep or less	80.00	97.00	90.00
1 revolv. distributor and syphon	5,000.00	5,915.00	5,100.00
35 cu.ft. chipping concrete	1.00	2.60	2.50
2,850 lb. misc. metal	.10	.15	.10
2,100 cu.yd. stone or gravel	3.00	3.80	3.00
150 cu.yd. bank gravel	2.00	2.73	2.00
150 cu.yd. filter sand	3.00	5.85	6.00
160 sq.yd. sodding	2.00	.52	.50
320 lin.ft. woven wire fence, 7-ft.	3.00	2.00	2.00
	$49,893.00	$52,779.31	$53,275.35

Lift Bridge at Elizabeth, N. J.

SUMMER St. bascule bridge over the Elizabeth River at Elizabeth, N. J., will be let under one contract in two lump-sum items, one covering the approach construction and the other covering removal of present bridge and construction of the new structure. The work is shown in the drawing.

Total length of the project is 285 ft. The bridge is 60 ft. clear between fenders and between tips of leaves for normal opening. It is 82 ft. c. to c. trunnions. Roadway is 30 ft. between curbs, with a 6-ft. sidewalk on each side. The approach roadways are 36 ft. wide and paved with asphaltic concrete on concrete base. The bridge paving is asphalt-plank roadway on laminated timber flooring.

Nine bids were received, and the lowest five are given below. Roi C. Collins is engineer of Union County.

	Approaches	Bridge	Total
Snyder Eng. Co., 315 Richmond St., Elizabeth	$7,000	$117,900	$124,900
F. W. Schweirs Jr. Co., New York	8,000	120,367	128,367
Tuller Construction Co., Red Bank, N. J.	7,000	121,390	128,390
Anderson Construction Co., Staten Island, N. Y.	9,227	120,218	129,445
Kolyn Construction Co., Trenton	12,000	117,838	129,839
Average nine bids	$10,029	$146,445	$156,475

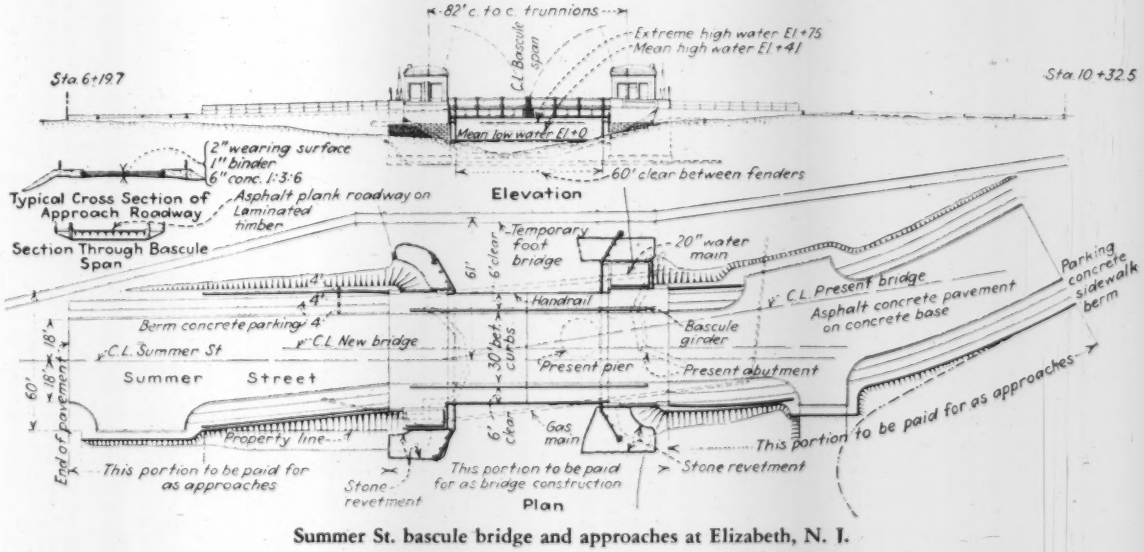
Water Line for Sharonville-Springdale, Ohio

WATER-SUPPLY line No. 150 for the villages of Sharonville and Springdale, Ohio, includes installation of the line and filling it with water. Minimum cover is 3½ ft., and joints are Leadite or equal. Valves are Cincinnati standard, which are somewhat heavier and contain more brass than A.W.W.A. valves. Hydrants are 7-in. three-way self-draining Cincinnati standard. J. S. Rafferty, sanitary engineer for Hamilton County, states that county water mains are laid where possible outside of the traveled roadway, standard being 5 ft. from edge of pavement. It is expected that an additional $15,000 will be spent for street restoration and extra depth excavation.

The work is laid out in three parts. Schedule A comprises eight or ten isolated lengths of main in various parts of the county. Schedule B includes 5 miles of 12-in. supply main and a distribution system for Sharonville, population 1,200. Schedule C is for 3 miles of 12-in. line, and supply, for Springdale. The mains are along paved county highways carrying heavy traffic. Excavation is ordinary except for possibility of 2- to 6-in. rock layers at several points.

There were respectively eleven, twelve and thirteen bidders on schedules A, B and C. Total of the high bids on the three schedules was 30 per cent above total of the low bids. The low bid was $55,366 on A, $84,404 on B, $91,229 on C. Unite prices were the same for the three schedules and are given for the three bidders on schedule C. These were Fred Haddad, 3032 West Boulevard, Cleveland, $91,229, (contract on schedule A); B, M. F. Quill & Son; C, James G. Meier, Norwood, Ohio, (contracts on schedules B and C).

	Unit Price	A	B	C
15 cu.yd. screenings	3.00	45	3.00	2.00
15 cu.yd. conc. Cl. B	10.00	150	10.00	10.00
27,254 lin.ft. 6" C.I.P.Cl. B	1.08	29,434	.95	.97
144 lin.ft. 6" C.I.P.Cl. C	1.15	165	1.00	.97
15,190 lin.ft. 8" C.I.P.Cl. B	1.38	20,962	1.40	1.30
5,610 lin.ft. 12" C.I.P.Cl. B	2.25	12,622	2.30	2.06
10,140 lin. ft. 12" C.I.P.Cl. C	2.45	24,843	2.49	2.06
27.6 tons Castings Cl. D	85.00	2,346	90.00	85.00
110 each 6" G.V.& B.	25.00	2,750	28.00	26.00
33 each 6" G.V.& Ch.	40.00	1,320	60.00	70.00
16 each 8" G.V.& Ch.	60.00	960	75.00	82.00
13 each 12" G.V.& Ch.	90.00	1,170	115.00	110.00
110 each 7" 3-way hydrants	60.00	6,600	59.00	63.00
1.5 m.b.m. sheeting	30.00	45	10.00	1.00
190 hrs. common labor	.50	95	.40	.50
75 hrs. skilled labor	1.00	75	.02	.01
40 hrs. truck labor	1.50	60	.02	.01
1 each Conn. to ex.main	10.00	10	10.00	10.00
		$103,653	$102,480	$96,243
Alternates				
27,398 lin.ft. 6" C.I.P.Cl. 250	.95	26,028	.93	.98
15,190 lin.ft. 8" C.I.P.Cl. 250	1.20	18,228	1.30	1.32
15,750 lin. ft. 12" C.I.P.Cl. 250	2.00	31,500	2.19	2.10
25.8 tons castings McWane type	85.00	2,193	75.00	85.00
Grand total (alternates)		$91,229	$96,197	$97,298



Summer St. bascule bridge and approaches at Elizabeth, N. J.

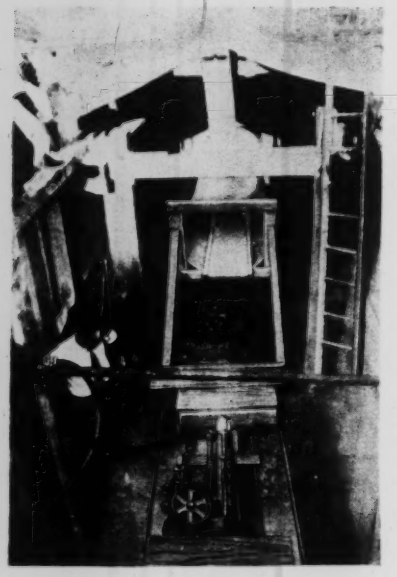
Dragline Bucket

(*Continued from p. 947*)

operation the bucket is well balanced, it can be kept in carrying position by a slight pull on the dump line. When released, the bucket dumps quickly and freely. It comes equipped with a drag chain made up of electric welded links and is provided with a socket for the drag cable and a guard to the fair-lead sheave. Alloy steel renewable reversible teeth and alloy steel heat-treated lips are regular equipment.

Air-Driven Jacks Used to Install Culverts

Several contractors in the Middle West have reported unusual success in installing pipe culverts by the jacking method, using the jack hoist developed by the Joyce-Cridland Co., Dayton, Ohio, primarily for the maintenance of heavy locomotives and other railway equipment. The Joyce jack hoist is a single unit composed of a specially built

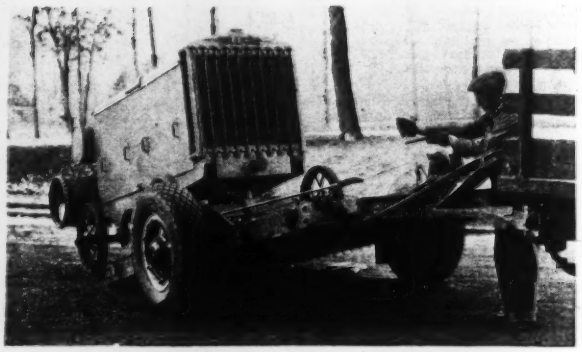


Jacking culvert under embankment

jack, a series of gears, and a 3¼-hp. heavy-duty Ingersoll-Rand reversible air motor. Automatic shut-offs at both upper and lower limits of the ram assure positive safety. Power for operation is furnished by a conventional air compressor; no manual labor is required.

Tilting Trailer Bed Forms Loading Ramp

Many applications in the construction field will be found for the At-Last-A trailer truck now being manufactured by the Sullivan Machinery Co., 400 North Michigan Ave., Chicago, Ill. Outstanding features of this unit include the following: Low bed, two-wheel design, tilting platform which forms its own loading ramp, hand winch for pulling on loads, pneumatic tires and spring suspension. The low bed makes for easy loading and also permits bulky loads to be piled higher with the same overhead clearance as the usual truck. Ground clearance remains the same as that of a passenger automobile. Loading arrangements are especially simple. By letting the platform tilt until the rear end is on the ground, which can be done without detaching the trailer from the towing vehicle, the bed of the trailer forms its own loading ramp. A cable from the winch at the head end is attached to the load to draw it up the inclined platform, where, after passing the pivot point, the weight of the load returns the bed to the horizontal. It is held in place during transport by a bolt dropped into the special drawbar.



Method of loading two-wheel trailer

This arrangement eliminates the necessity for jacking or cribbing. For unloading, the procedure is reversed.

The low bed, the two-wheel design and the use of spring suspension permit fast road speeds without danger of upset. Easy rolling is also a feature of the trailer, which can be drawn by a small passenger car if desired. Sizes are available in a wide range of capacities up to 10 tons.

Business Notes

A Good Roads Exhibition will be held Sept. 12-Oct. 2 at Shanghai, China, in cooperation with the National Good Roads Conference of national, provincial and municipal authorities, according to an announcement by the U. S. Department of Commerce. Exhibition offices are located at 16 Jinkee Road, Shanghai, cable address Roadxibit.

Blaw-Knox Co., Pittsburgh, Pa., has acquired exclusive sales and manufacturing rights for the Ateco line of earth-moving machinery from the American Tractor & Equipment Co., Oakland, Calif., for the United States east of the Rocky Mountains and for all other countries.

Geo. D. Whitcomb Co., Rochelle, Ill., has become a division of the Baldwin Locomotive Works, and will operate as a self-contained unit to be known as the Whitcomb Locomotive Co. Officers of the new organization include George H. Houston, president, who is also president of the Baldwin Locomotive Works; John P. Sykes, vice-president; H. H. Perry, vice-president and general manager; H. V. Huleguard, sales manager.

The Dorr Co. and Oliver United Filters, Inc., have been united by the formation of the Dorr-Oliver Corp. under the joint management of John V. N. Dorr and Edwin L. Oliver. The corporation will function through two wholly owned operating units retaining their present names and staffs, making joint use of technical information and carrying on joint research and development work.

Permutit Co., New York City, has appointed two special representatives in the railroad field. J. R. Crocker will have his headquarters at 215 Pershing Road, Kansas City, Mo., and W. R. Toppan at 332 South Michigan Ave., Chicago, Ill. They will cover the western and eastern sections of the country, respectively.

Babcock & Wilcox Co., New York City, has acquired non-exclusive licenses to use the automatic arc-welding patents of the Automatic Arc Welding Co.

Buda Co., Harvey, Ill., is celebrating the 50th anniversary of the founding of the organization.

Chicago Pneumatic Tool Co., New York City, announces the election of H. A. Jackson as executive vice-president.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been awarded a contract covering electrical equipment to be used in the construction of the Hoover Dam by Six Companies, Inc., San Francisco, Calif. The award includes motors and control apparatus for all electric shovels, hoist pumps, conveyors and compressors, also electric locomotives, switching equipment meters and other apparatus.

Caterpillar Tractor Co., Peoria, Ill., has decided to discontinue production of its Super-Mogul, Super-Reliance, Super-Special and Twenty graders, which are being superseded by equivalent leaning-wheel models.

Fairbanks, Morse & Co., Chicago, Ill., has announced the appointment of R. H. Bacon, former advertising manager, as manager of the pump sales division with headquarters in Chicago.

Reading Iron Works Co. has appointed J. K. Aimer assistant general manager of sales and W. S. Shiffer assistant to the general manager of sales. R. I. Fretz has been transferred from the Reading district to the Pittsburgh district in place of Wyman Howells, who will now direct the activities of the Reading district.

Eric Engineering Co., Chepstow, Monmouthshire, England, has been granted an American patent on a process for the recoating in place of water mains with bitumen after scraping and cleaning.

Dardelet Threadlock Corp., New York City, has granted licenses to the Colorado Fuel & Iron Co. for the manufacture and sale of track and commercial bolts and nuts with the Dardelet self-locking thread.

Jeffrey Mfg. Co., Columbus, Ohio, has elected Neil E. Salsich to the position of vice-president and general sales manager. Mr. Salsich was formerly associated with the Bethlehem Steel Co. as manager of railroad and mining sales.

Western Pipe & Steel Company of California on May 11 elected Howard G. Tallerday, executive vice-president, to the position of president. He succeeds James A. Talbot, who resigned to devote his attention to personal matters.

Graver Tank & Mfg. Co., East Chicago, Ind., announces the appointment of W. B. Connor as its Eastern representative, with office in the Chrysler Building, New York City.

Walter Alfred Moser, 45, district manager of the Westinghouse Electric & Mfg. Co. in Salt Lake City, Utah, died May 22 of heart disease. He had been associated with Westinghouse since shortly after his graduation from the University of Nebraska in 1907, was a past-president of the Electrical League of Utah and a member of the Utah Society of Engineers.

Business Side of Construction

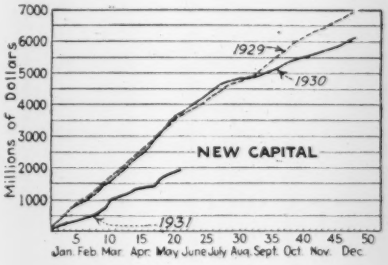
Capital and Contracts

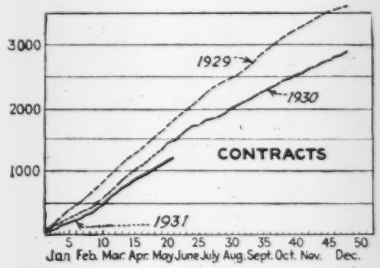
New capital issued in May totaled 313 millions of dollars, compared with 918 millions in May, 1930. Cumulative figures are 1,965 and 3,648 millions for the two years respectively. The large issues of the current week include $5,000,000 Nassau county, N. Y., 3¾s for roads and hospital; $3,000,000 Chicago 4½s for improvements to Lincoln Park; $1,086,000 Morris county, N. J., 3¾s.

Values of contracts let for the first week of June are given below:

(In Thousands of Dollars)

	June 4, 1931	Average of Last Four Weeks 1931	1930
Buildings:			
Industrial	$4,862	$3,836	$8,380
Other	16,101	18,588	27,770
Streets and roads	14,011	16,257	19,101
Other eng. constr.	20,705	15,065	40,172
Total	$55,679	$53,748	$95,424
Total, all classes, Jan. 1 to June 4:			
1931			$1,253,500
1930			1,645,960





Four Wage Advances Contrast With Numerous Cuts

At least four labor groups received wage advances in various localities during May. On the other hand, strikes broke out in four cities, mostly over reductions in the scale. Trades in two cities accepted cuts without a fight, while four instances were reported of trouble arising over violation of prevailing rates. Some 25,000 laborers were assured jobs on public works projects in eight cities during June and July. Local notes follow:

Greenwich—Laborers on three highway jobs struck May 22 for an advance of 50c. per day to $6.50. A mob of 1,000 strikers stormed Town Hall in an effort to present demands.

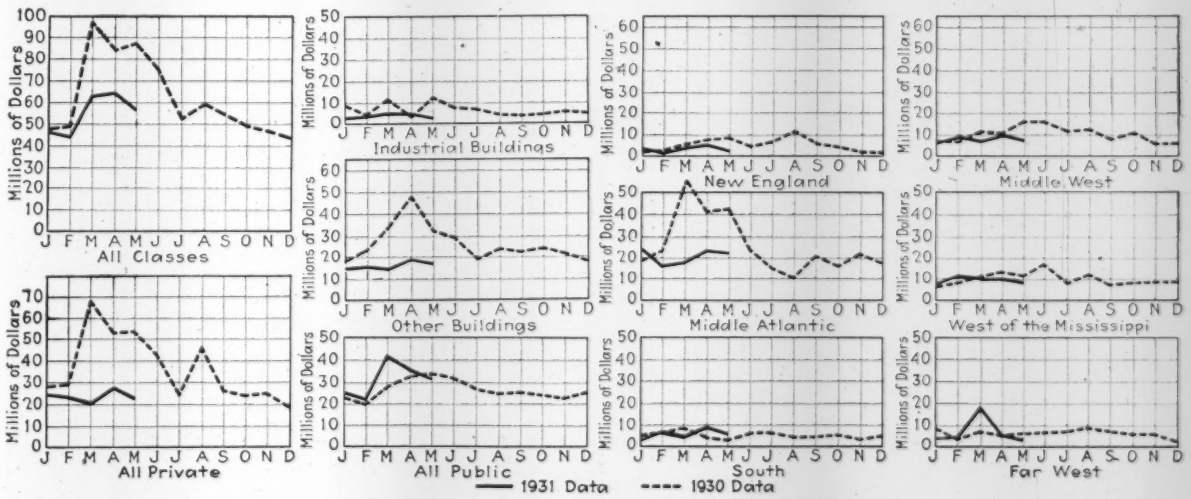
Albany—State and municipal projects promise work for at least 800 men in the Albany district. Possibilities of delay, however, appear in the state's share of the program. Union carpenters and engineers on high school and filtration plant projects, respectively, struck May 9, claiming that contractors failed to pay prevailing scale required on city work.

Syracuse—Laborers mixing concrete

ENGINEERING CONSTRUCTION CONTRACTS REPORTED IN MAY, 1931

Thousands of Dollars (000 omitted)

	New England	Middle Atlantic	South	Middle West	West of Mississippi	Far West	United States May, 1931	United States Five Months 1931	United States Five Months 1930	Canada, May, 1931
Water-works	$433	$2,386	.....	$692	$920	$817	$5,248	$26,550	$22,348	$81
Sewers	132	1,467	$319	617	506	213	3,254	30,403	34,481	953
Bridges public	791	2,975	912	3,581	1,631	1,911	11,801	a 45,374	47,859	.....
Excavations	85	488	.....	3,062	563	.....	4,198	11,139	8,351	76
Streets and roads	2,526	16,474	12,879	11,611	14,584	5,093	63,167	274,480	242,960	2,161
Federal government	500	1,181	2,815	1,059	1,893	2,892	10,340	128,101	44,733	.....
Unclassified public	397	4,061	103	614	40	207	5,422	45,650	65,730	424
Buildings, public	3,444	8,311	1,177	3,156	2,214	304	18,606	105,711	134,450	1,025
Tota. public	$8,308	$37,343	$18,205	$24,392	$22,351	$11,437	$122,036	$667,408	$600,912	$4,720
Buildings, industrial	1,725	7,503	80	1,182	1,286	830	12,606	80,391	171,063	803
Buildings commercial	5,388	39,743	150	4,181	3,301	1,650	54,413	272,733	516,371	1,370
Bridges, private	67	.....	2,875	3,135	171	.....	6,248	6,553	5,422	.....
Unclassified private	329	9,343	2,071	1,165	8,162	1,460	22,530	170,736	254,875	.....
Total private	$7,509	$56,589	$5,176	$9,663	$12,920	$3,940	$95,797	$530,413	$947,731	$2,173
May total, 4 weeks	**15,817**	**93,932**	**23,381**	**34,055**	**35,271**	**15,377**	**217,833**	.....	.....	**6,893**
April, 1931, 5 weeks	28,290	117,867	42,870	50,898	47,710	29,270	316,905	.....	.....	12,640
May, 1930, 5 weeks	44,043	193,732	16,939	78,025	52,194	32,164	417,097	.....	.....	16,712
Five months, 1931	79,656	462,396	125,255	184,253	193,541	152,720	.....	1,197,821	.....	53,002
Five months, 1930	105,383	754,365	112,799	228,146	206,197	141,753	.....	.....	1,548,643	73,793



Contracts awarded, showing trend by classes and sections

on reservoir project granted advance of 5c. per hour to 45c. in an effort to observe prevailing local rate of wages.

New York—Fifteen thousand men are now employed on streets, parks and other public works three days a week at $5.50 a day, as provided for under recent $2,000,000 municipal fund for relief of unemployment. List of eligibles confined to those who have voted here for last two years.

Trenton—Hearing held May 14 by state highway commission in which union carpenters from Essex, Bergen and Mercer counties claimed contractors were hiring non-residents on road construction. It was further charged that contractors in Bergen County paid carpenters 60 to 80c. per hour instead of the prevailing rate of $1.50. A new law which corrects the first condition by giving preference to residents of New Jersey on all public projects within the state becomes effective July 4, 1931.

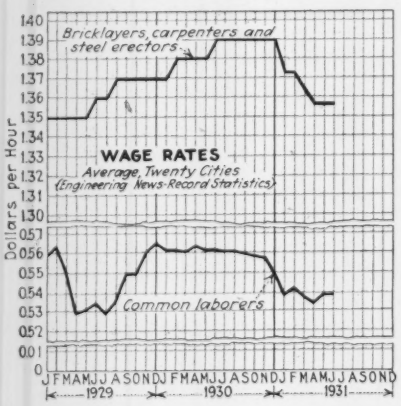
Philadelphia—A slight increase in employment noted, due mostly to public-works construction in excess of the usual amount. Part of the re-employment occurred in building materials plants. During June, 1,000 men will be put to work on various municipal improvement projects.

Wilmington—Increased activity reported in building trades, particularly among painters. Shipyards also getting ready for resumption of work.

Baltimore—Charge that contractors on municipal work pay rates below current minimum scale is being investigated by grand jury.

Washington—From headquarters of the Bricklayers, Masons and Plasterers International Union comes a heated criticism of the suggestion made May 8 by organized contractors that the "prevailing wage" law be amended. The contractors contend that wage rates on federal government contracts should be predetermined and specified in the contract. The union quotes a contractor-official as suggesting "a constructive amendment to make the wage law workable and equitable and, at the same time, assure a living wage to construction labor." The words "living wage" evidently have started a conflagration, judging from the threat of the union that "organized labor will give these organized employers the battle of their life," should a so-called "living wage" be written into the law. The union's interpretation of the term is that it "cannot be anything except a bare subsistence wage."

Memphis—Jobs for 1,000 additional construction workers are seen in the $5,000,000 public improvement program for the remainder of 1931. Need for common laborers (mostly colored) on levee construction and other heavy work now nearly equal to supply.



Akron—Bricklayers' wages reduced 10c. per hour to $1.45.

Youngstown—Wage increase granted sheet- and tin-mill workers is first advance in nearly two years. A sudden release of orders for steel sheets (mostly automotive) caused resumption of activities in sixteen local mills in two days, with result that employment was provided for 1,000 men.

Mansfield—Strike amicably settled May 18, with proposed wage cut of 15 per cent abandoned by mill owners. Instead, an increase of 4c. per hour to 36c. was granted common laborers in the steel mills, who in the beginning had demanded an increase of 8c. per hour to 40c.

Chicago—There have been fewer local labor disturbances during the last 18 months than at any time in twenty years. In the depression of 1921, strikes and lockouts affected all local building trades, and Judge Landis was called to serve as umpire. Forty construction projects now in immediate prospect give steel fabricators in this district brightest outlook they have had at any time this year. Meeting held May 27 between employers and unions, to consider proposed wage reduction affecting all classes of labor in the Chicago territory; decision not yet rendered. Electrical workers' union waived right to wage advance of 25c. per day due under terms of five-year agreement.

Indianapolis—Half of the total number of union building trades mechanics locked out by an organization of contractors on jobs aggregating $5,000,000. The men refused a wage cut of 20 per cent, claiming that contractors bid on basis of existing wage scale.

Detroit—City plants to adopt five-day week for all laborers.

Kansas City—Construction of new post office will employ 3,000 men before end of July.

Wichita—An emergency employment bureau discontinued because of improvement in local business conditions. Topeka reports similarly.

St. Louis—River improvements drawing on the surplus of unskilled laborers; quota used still below seasonal average. Railroads increased number of construction workers during May.

Houston—Contractors on several local projects cut union rates $2 per day, with result that on May 13, eight skilled crafts struck.

Las Vegas—Common laborers on Hoover Dam project now receive a minimum wage of 50c. per hour, or $4 a day, an advance of 50c. per day over the former minimum of $3.50. Three hundred and sixty men are now on the job in the employ of the contractors.

Denver—After having been closed down for a month, local steel rolling mills and lead smelteries reopened in May, re-employing 1,500 and 115 men respectively.

Los Angeles—Municipality now has 12,000 men working alternate weeks on public works, an increase of 2,000 over the number employed in the first week of May.

San Francisco — Ordinance passed May 11 fixing wage rate on municipal work at highest prevailing schedule now obtaining on private projects. Two hundred additional men will be employed on a $500,000 street-railway construction program, to start soon. Unemployment registration decreasing slightly.

CURRENT BUILDING AND CONSTRUCTION TRADES WAGE RATES PER HOUR

Advances since last month are indicated by **heavy type**, declines by *italics*

Cities	Bricklayers	Carpenters	Hoisting Engineers	Hod Carriers	Pile Drivers	Structural Iron Workers	Common Labor*
Atlanta	$1.25@1.40	$0.60@.70	$0.60@1.00	$0.50	.....	$0.75@1.25	$0.25@.35
Baltimore	1.75	1.00@1.10	1.00@1.37½	1.00	$0.65	1.00@1.25	.30
Birmingham	1.25	.75	1.00	.30	.....	1.00	.25
Boston	1.50	1.37½	1.37½	.85	1.27½	1.37½	.40@.80
Cincinnati	1.62½	1.40	1.40	1.00	1.40	1.40	.35@.60
Chicago	1.70	1.62½	1.62½	.97½	1.62½	1.62½	.97½
Cleveland	1.62½	1.37½	1.37½	.87½	1.10	1.50	.35@.60
Dallas	1.75	1.12½	1.25	.35@.75	1.25	1.25	.35@.50
Denver	1.50@1.62½	1.25	1.25@1.37½	.87½@1.00	.....	1.25	.43¾@.62½
Detroit	1.56¼	1.00@1.25	1.00@1.10	.90	1.00@1.10	1.00@1.25	.50@.60
Kansas City	1.50	1.37½	1.37½@1.50	.90@1.00	1.37½@1.50	1.50	.25@.75
Los Angeles	1.37½	1.00	1.00	.75	.87½	1.00	.50
Minneapolis	1.25@1.30	.80@.90	.90@1.00	.80	.....	1.00@1.25	.50@.65
New Orleans	1.00	50@75	1.25	.75	.80@1.00	1.12½@1.25	.20@.35
New York	1.92½	1.65	1.92½	1.03½	1.78¾	1.92½	1.03½
Philadelphia	1.75	1.25	1.02½@1.36	.70@1.12½	1.00	1.37½@1.62½	.40@.50
Pittsburgh	1.75	1.50	1.50@1.56¼	1.12½	.....	1.50	.40@.80
St. Louis	1.75	1.50	1.60@1.75	1.15@1.25	1.25	1.75	.30@.87½
San Francisco	1.37½	1.12½	1.12½	.87½	1.12½	1.37½	.68¾
Seattle	1.50	1.12½	1.12½@1.25	1.00	1.25	1.25	.70
Average	1.54	1.19	1.28	0.8640	1.20	1.34	0.5394
Montreal	1.12½	.75	....	.....	.90	.75@.90	.35

*Minimum rates are mostly non-union and for construction other than buildings.

Spokane—Electrical workers union accepts wage cut of $1 per day, to $8.

Montreal—Building craftsmen report offers of jobs below statute wage schedule. Municipal authorities threaten to deny privilege of presenting bids on future work, to contractors found violating the rule.

Wage Rates—Average hourly rate for skilled building trades mechanics is $1.36, same since April. A year ago it was $1.39. In manufacturing, the skilled rate is 65c. The national average for common labor is 53.94c., unchanged from May. A year ago this rate was 56.28c. In manufacturing, the unskilled rate is 47c. per hour.

Lowest May Contract Total Since 1926

Engineering construction in May averaged 54 millions of dollars per week, compared with 63 millions in April, and 85 millions in May, 1930. Public works averaged 30.5 millions, compared with 34 a year ago. The street and road rate was 16 millions, compared with 13 per week for the five months. The month's total is the smallest May since 1926, when the weekly rate was 61 millions.

Materials Prices Continue Downward

With preliminaries now under way in the Federal Trade Commission's investigation of government contract lettings and an ebb tide running in prices of materials, the way appears clear for prospective builders again to come into the market in appreciable numbers. The purpose of the federal inquiry is to locate agreements supposedly existing between materials manufacturers or dealers and contractors or bidders on government buildings, which would have the effect of bolstering prices. The declines of the month were well scattered and affected nearly everything except, possibly, aggregates and asphalt in certain localities.

Cement—In the wake of the price war there are a few cities remaining in which cement costs more than $2 a barrel, net, delivered by truck to job. The mill base, likewise, is practically $1, net, for paving purposes, which furnishes an outlet for about 32 per cent of all cement manufactured in this country. The basis of trading throughout the entire industry is now one in which the price to contractors on state, county, railway or hydroelectric projects, is identical with that charged dealers for carload lots. The dealer pays the carlot price at mill and resells the cement for whatever he can get for it. There are no visible signs of cessation in the price war, but as yet no bid-price has been lower than that offered last month in Kansas, of 60 cents per barrel, bulk, at the mill. Preliminary work is under way in the Federal Trade Commission's separate investigation of the cement industry, which is an attempt to determine whether or not activities of associations, manufacturers or dealers constitute violation of the anti-trust laws. The present bent of the industry toward complete demoralization would seem to indicate that collusion, if existent, was highly unsuccessful. Lower cement prices are reflected in reductions on concrete blocks of 2c. to 15c. at St. Louis, and 1c. to 16c. and 22c. at Pittsburgh.

Lumber—May prices reached lowest levels within the memory of wholesalers in the New York-New Jersey tidewater area. Pine 3x10s are off $5 per 1,000 ft. to $55, and fir $3.50 to $31.50 delivered in New York. Deductions likewise were effective in Baltimore, St. Louis, and Denver. Railway ties were cut 5c. to 59c. in San Francisco and 70c. in St. Louis, for untreated fir and cypress, respectively. Slack demand is not the sole cause of present trouble in the lumber market—there is excessive over-supply of cut material. For instance, the ratio of unfilled orders to reserve stocks is now 19.4 per cent, while a year ago it was 23.8.

Brick—Demand for common building brick in New York, the chief market, is greater by one-third than it was a year ago. Rate of consumption is 50,000,000 per month, which is about 58 per cent of the amount held over at the end of the month in the New York-New Jersey district. With demand so close to supply the price advance of 50c., effective in April, is certain to hold despite weakness in the market for many other materials. Moreover, clay products plants in this district are working close to capacity on orders for small dwelling construction requiring brick and tile, which appear to have revived remarkably in the last two months—at least locally. In the 1921 depression brick makers of the Chicago district reduced the price $4 per 1,000, to $12, in an effort to encourage building. The building boom came and went, without the local price recovering once from its former depression level. The Atlanta price is down 25c. per 1,000 to $11.25, and that at Pittsburgh $1, to $16, compared with May levels. Face brick declined $2 per 1,000, to $22, at Pittsburgh, and the same amount, to $30, in Minneapolis, during May.

Road Oils and Asphalts—Severest competition persists in the market for road oils and asphalts derived from petroleum. One oil company in May laid off every industrial oil employee in the southeastern territory and sold 180,000 barrels of oil at 8c. a barrel in order to raise cash. Demand for petroleum and lake asphalt has receded 16 per cent and for rock asphalt 11 per cent in the last year. Meanwhile, production has been restricted by 15 per cent. Bulk lots of paving asphalt are up 50c. per ton to $15.50 at St. Louis, and $1. to $27, for special grades, at New Jersey plants. In one or two isolated instances prices in the metropolitan district have been shaded $1 per ton.

Lime—Pittsburgh and Cleveland prices on hydrated common grade are off $2 per ton. Lump lime is steady.

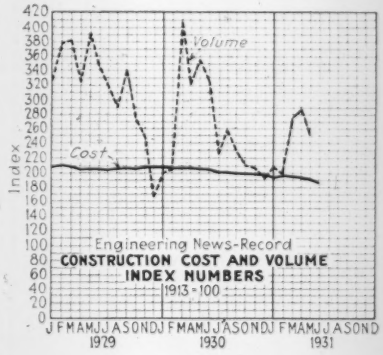
Aggregates—Gravel pits in Wyoming are running at full capacity on orders for material to be used along various divisions of the Union Pacific Railroad as far east as Kansas. Prices are the same as in May.

Gypsum Products—Plants at Warren, Ohio, operating day and night shifts owing to heavy orders for special doorway and window-arch material.

Steel—Reinforcing bars dropped 5c. per 100 pounds, to $1.60, base, Pittsburgh, during May. A year ago the base was $1.75. Structurals remain unchanged, with tendency to cut price on mill contracts greatly lessened. Wire nails, sheets and scrap prices continue to sag.

Construction Cost and Volume Index Numbers

Cost index is lowest since September, 1922, the year of deflated prices following the 1920 peak. The current index is 2.6 per cent under the average of the first six months of 1931 and 9.2 per cent below that of the first half of 1930. May volume was 13.1 per cent under the April level and 29 per cent below that of May, 1930.


Volume
Cost
Index
Engineering News-Record
CONSTRUCTION COST AND VOLUME
INDEX NUMBERS
1913 = 100
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1929
1930
1931

E. N.-R. Cost		E. N.-R. Volume	
June, 1931	**187.23**	**May, 1931**	**251**
May, 1931	189.33	April, 1931	289
June, 1930	203.36	May, 1930	354
1930 (average)	202.85	1930 (average)	260
1929 (average)	207.02	1929 (average)	317
	1913 (average) 100.00		
1930		1930	
January	208.96	January	199
February	206.46	February	204
March	206.80	March	408
April	207.12	April	320
May	205.86	May	354
June	203.36	June	324
July	200.95	July	226
August	200.95	August	259
September	199.58	September	232
October	198.72	October	211
November	198.54	November	207
December	196.86	December	192
1931		1931	
January	194.48	January	208
February	196.61	February	198
March	194.51	March	278
April	191.63	April	289
May	189.33	May	251
June	187.23		

Current Prices of Construction Materials

Price advances since last month are indicated by **heavy type**; declines by *italics*

Building Materials

PORTLAND CEMENT—Prices per barrel, for cement in cloth, *without including charge for four bags at 10c. each.* Cash discount not deducted. Prices are delivered by truck to contractors at site of job:

	June 4, 1931	One Mo. Ago	One Yr. Ago
Atlanta	$2.35	**$2.35**	$2.34
Baltimore	1.75	**1.75**	2.60
Birmingham	*1.46*	**2.40**	2.60
Boston	2.20	**2.20**	2.50
Chicago	1.95	**1.95**	2.20
Cincinnati	*1.60*	**1.72**	2.94
Cleveland	*1.40*	**1.55**	2.80
Dallas	1.88	**1.88**	2.15
Denver	*2.15*	**2.20**	2.61
Detroit	2.08	**2.08**	2.60
Jersey City	2.09	**2.09**	2.60
Kansas City	*1.48@2.15*	**2.15**	2.65
Los Angeles	1.92	**1.92**	1.92
Minneapolis	*2.05*	**2.15**	2.50
Montreal	*2.18*	**2.21**	2.20
New Orleans	*1.95*	**2.33**	2.65
New York	*1.85@2.00*	**1.95@2.00**	2.15@2.20
Philadelphia	*2.00*	**2.20**	2.10
Pittsburgh	*1.76*	**1.96**	...
St. Louis	*1.85*	**2.05@2.10**	2.45
San Francisco	*2.34*	**2.42**	2.64
Seattle	1.70	**1.70**	2.70

Current mill-prices per barrel, in carloads, without bags, f.o.b.:

Alpena, Mich	$1.30	Mason City, Ia	$1.10
Buffington, Ind	*1.10*	Norfolk, Va	1.71
Hannibal, Mo	*1.10*	Northampton, Pa	*1.21*
Houston, Tex	1.94	North Birmingham, Ala	*1.41*
Hudson, N. Y	*1.31*	Richard City, Tenn	1.41
Ironton, Ohio	*1.06*	Steelton, Minn	1.61
Iola, Kan	1.10	Universal, Pa	*1.21*
La Salle, Ill	1.10	Wyandotte, Mich	1.30
Limedale, Ind	1.20		

SAND AND GRAVEL—Per ton, delivered by dealers. Weight of sand per cu.yd., 1½ tons; gravel, 1½ tons, unless otherwise specified in pounds:

	Gravel		Sand
	1½ In.	¾ In.	
Atlanta	$3.25	$3.25	$2.50
Baltimore	2.35	2.55	2.08
Birmingham, per cu.yd., 2,600 lb	**3.00**	**3.00**	2.25
Boston	1.60@1.75	1.60@1.75	.90@1.15
Chicago, per cu.yd	2.00	2.00	2.00
Cincinnati	1.50	1.50	1.25
Cleveland, per cu.yd., 3,000 lb	2.60	2.60	**2.50**
Dallas, per cu.yd., 2,750 lb	3.00	3.00	2.50
Denver, per cu.yd., 2,700 lb	1.95	1.95	1.35
Detroit	*2.50*	*1.85*	*1.65*
Kansas City	...	...	...
Los Angeles	1.90	1.90	1.40
Minneapolis, per cu.yd., 2,800 lb	1.70@2.40	1.70@2.40	1.00
Montreal	1.50	1.50	1.25
New Orleans, per cu.yd., 2,700 lb	2.95	2.95	1.80
New York, per cu.yd.*	3.40	3.40	2.15
Philadelphia	2.10@2.95	2.35@3.20	1.55@2.40
Pittsburgh	1.55	1.55	1.75
St. Louis	1.40@1.55	1.40@1.55	1.00@1.20
San Francisco	1.75	1.75	1.75
Seattle, per cu.yd., 3,200 lb	1.85	1.85	1.85

*New York gravel weighs 2,800@3,000 lb. and sand, 2,700 lb. per cu.yd.

CRUSHED STONE—Per ton, delivered by dealers. Weight per cu.yd., 1½ tons, unless otherwise specified in pounds:

	1½ In.	¾ In.
Atlanta	$3.25	$3.25
Baltimore	2.60	2.80
Birmingham	3.00	3.25
Boston	1.90@2.00	1.90@2.00
Chicago, limestone, per cu.yd., 2,500 lb	2.00	2.00
Cincinnati	2.25	2.25
Cleveland	2.60	2.60
Dallas, per cu.yd., 2,500 lb	3.25	3.25
Denver, granite, per cu.yd., 2,700 lb	2.50	2.50
Detroit, limestone	2.00	2.00
Kansas City	**2.00**	**2.00**
Los Angeles	1.90	1.90
Minneapolis, limestone, per cu.yd., 2,600 lb	2.40	2.40
Montreal	1.80	2.00
New York, limestone, per cu.yd	3.40	3.40
Philadelphia, limestone	2.30@3.15	2.30@3.15
Pittsburgh	3.25	3.25
St. Louis	1.40@**1.45**	1.40@**1.45**
San Francisco, trap rock	1.65	1.65
Seattle, per cu.yd., 2,700 lb	3.00	3.00

CRUSHED SLAG—Prices for carloads, per net ton, at plant:

	1½-In.	¾-In.	Roofing	Sand
Birmingham, Ala	$0.90	$1.15	$2.05	$0.55
Buffalo District	1.25	1.35	2.25	1.25
Cleveland, Ohio	1.10	1.10	...	1.30
Western Pennsylvania	1.25	1.25	2.00	1.25
Toledo, Ohio	1.10	1.10	1.10	1.06
Youngstown District	1.25	1.35	2.00	1.25

CONCRETE BLOCKS—Standard, 8x8x16-in., hollow, delivered to job, each:

Boston	$0.16@$0.20	Minneapolis	$0.11
Brooklyn and Queens	.12@ .14	New Orleans	.20
Cleveland	.16@ .17	Philadelphia	.18@.25
Denver	.22	Pittsburgh	*.16@.22*
Detroit	**.12**	St. Louis	*.15*
Kansas City	.18		

HOLLOW TILE—Building tile per block, delivered by dealers to contractors in lots of 2,000 pieces or over:

	4x12x12	6x12x12	8x12x12	10x12x12	12x12x12
Atlanta	$0.14	$0.18	$0.24	$0.30	$0.36
Baltimore	.105	.....	.20	.....	.26
Birmingham	.089	.122	.167	.219	.25
Boston	.082	.118	.152	.21	.35
Chicago	.068	.0935	.1275	.1647	.183
Cincinnati	.06815	.09485	.129	.165	.184
Cleveland	.048	.066	.09	.117	.13
Dallas	*.0885*	*.1235*	*.1485*	.251	.306
Denver	.0975	.135	.175	.2 25	.25
Detroit	.08	.11	.145	.19	.215
Kansas City	.088	.11	*.145*	*.19*	*.21*
Los Angeles	.085	.122	.175	.232	.285
Minneapolis	.0611	.081	.10605	.1302	.1737
New Orleans	.068	.093	.13	.176	.212
New York	*.082*	.1296	.162	.....	.....
Perth Amboy, N. J.(f.o.b.)	.....	.....	.....	.2388	.2956
Philadelphia	.105	.14	.215	.28	.34
Pittsburgh	.0545	.0765	.1035	.135	.148
St. Louis	.075	.10	.14	.175	.21
San Francisco	.108	.156	.255	.....	.....
Seattle	.085	.115	.18	.....	.....

BRICK—Prices delivered by dealers per thousand, are as follows:

	Common	Face	Paving F.O.B. 3x8½x4-In.	Paving F.O.B. 3½x8½x4-In.
Atlanta	*$11.25*	$21.50	$42.00	$47.00
Baltimore	13.00	25.00	40.00	46.00
Birmingham	13.50	22.50	26.00	28.00
Boston	14.00	28.75	43.00	47.50
Chicago	12.00	.....	42.00	45.00
Cincinnati	16.00	24.00	35.00	37.00
Cleveland	12.00@14.00	*21.00@28.00*	33.00	36.00
Dallas	14.50	17.50	.....	29.50
Denver	9.00@10.00	25.00	.....	.....
Detroit	*14.50@15.50*	25.00	35.50	37.50
Kansas City	14.00	.....	35.00	37.50
Los Angeles	13.00	26.50	.....	.....
Minneapolis	10.50	*30.00*	.....	.....
Montreal	28.00	.....	.....	.....
New Orleans	13.00	.....	35.00	42.00
New York	13.50	28.00	45.00	50.00
Philadelphia	16.00	.....	40.00	45.00
Pittsburgh	*16.00*	*22.00*	41.00	58.00
St. Louis	12.00	**22.00**	35.00	35.00
San Francisco	14.00	.....	45.00*	.....
Seattle	14.00	.....	.....	48.50

*2¼x8½x4-in.

LIME—Prices delivered by dealers to job:

	Hydrated, per Ton		Lump, per Barrel	
	Finishing	Common	Finishing	Common
Atlanta	$20.00	$12.50	.....	$2.50†
Baltimore	22.00	14.00	.....	2.25†
Birmingham	**30.00**	**17.50**	$3.00†	2.00†
Boston	22.00	14.50	4.00*	3.10*
Chicago	15.00	14.50	15.00‡	15.00‡
Cincinnati	13.05	10.70	.....	.....
Cleveland	*12.00*	*10.00*	2.50†	2.50†
Dallas	20.00	.....	2.35†	.....
Denver	32.00	23.75	3.80*	3.00*
Detroit	14.00	12.00	1.75†	1.65†
Kansas City	*19.00*	18.00	2.20†	2.00†
Los Angeles	18.90	16.00	2.85†	14.00‡
Minneapolis	25.50	21.00	.....	1.70†
Montreal	18.00	10.00	.....	.....
New Orleans	25.00	15.00	2.65†	1.95†
New York	21.00	15.50	4.10*	3.15*
Philadelphia	18.00	15.00	18.00‡	14.00‡
Pittsburgh	*13.50*	*13.00*	4.25*	2.75†
St. Louis	22.00	18.00	15.00‡	15.00‡
San Francisco	20.00	20.00	.....	1.85†
Seattle, paper sacks	35.00	24.00	.....	2.80†

*Per 280-lb. bbl. (net). †Per 180-lb. (net). ‡Per ton.

LIMESTONE—Mill blocks, f.o.b. siding, per cu.ft.:
New York: Rustic buff, $1.42; Standard gray, $1.47; Standard, $1.57; Selected gray, $1.57; Selected buff, $1.67.
Boston: Rustic buff, $1.45; Standard, $1.58; Selected buff, $1.71.
Pittsburgh: Rustic buff, $1.03; Standard, $1.18; Selected buff, $1.28.

SLATE—Foofing, f.o.b. quarry, Bangor, Pa., net, per square;

No. 1 Clear	$9.00@$14.00
No. 1 Ribbon	7.50@ 10.25
Medium Clear	8.00@ 10.50

Road and Paving Materials

PAVING STONE—Carload lots of granite blocks, 4x8x4-in., dressed, f.o.b.:

Atlanta	$3.00 per sq.yd.
Baltimore	3.00 per sq.yd.
Birmingham	2.50 per sq.yd.
Boston	135.00 per M.
Chicago, 5 in.	3.25@3.90 per sq.yd.
Cincinnati	110.00 per M.
Cleveland	115@120 per M.
Detroit, 5 in.	3.00 per sq.yd.
Kansas City	3.75 per sq.yd.
Minneapolis, 4½x8x5 in.	2.80 per sq.yd.
Montreal	104.75 per M.
New Orleans	2.80 per sq.yd.
New York, 5 in., Grade 1, 30 blocks per sq.yd	150.00 per M.
Philadelphia	125.00 per M.
St. Louis, 4x5x8 to 12 in.	3.50 per sq.yd.

Current Prices of Construction Materials

Road and Paving Materials—Continued

WOOD-BLOCK PAVING—Prices, f.o.b., in carloads:

	Size of Block	Treatment	Per Sq.Yd.
Atlanta	3½	16	$2.25
Birmingham	3½	16	2.29
Boston	3½	16	2.25
Chicago	3½	12	1.80@2.00
Kansas City	3½	16	2.50
Minneapolis	3½	16	2.50
Montreal	4	16	4.50
New Orleans	3½	16	2.30
New York	3½	16	2.50
St. Louis	3½	16	2.10

FLAGGING—Alongside dock, New York: Manhattan and Bronx, 4 ft. wide, 24c. per sq.ft.; Queens, 5 ft. wide, 26c. per sq.ft.

CURBING—Prices per lin.ft., f.o.b., cutting charges not included:
New York: Bluestone, f.o.b. barge, 5x16-in., rough, 90c.
Birmingham: Granite, 5x18-in., 90c.
St. Louis: Class "B" straight, 5x16-in., 75c.; roundings, $1.05@$1.30.

ASPHALT—Paving asphalt, f.o.b., per ton. Packages are 350-lb. bbls. or 425-lb. drums, in carload lots:

	Packages	Tank-car or -boat
Atlanta	$18.40	$14.40
Baltimore	16.00	12.00
Birmingham (f.o.b. refinery)	18.00	12.00
Boston	22.00	17.50
Chicago	22.50	18.30
Cincinnati	.....	12.00
Cleveland	23.00	19.00
Dallas	20.00	.....
Denver	35.00	.....
Detroit	16.68	12.43
Kansas City (f.o.b. refinery)	16.00	11.00
Los Angeles (f.o.b. refinery)	18.00	12.00
Maurer, N. J. (Bermudez)	.....	**27.00**
Maurer. N. J. (Trinidad)	.....	*23.50*
Minneapolis (f.o.b. Twin Cities)	23.10	18.10
Montreal	28.00	21.50
New Orleans	24.00	21.00
New York (f.o.b. refinery)	16.00	12.00
Philadelphia	16.00	12.00
Pittsburgh	24@26	14@18
St. Louis	*18.50@19.50*	**15.50@16.50**
San Francisco (f.o.b. refinery)	18.00	12.00
Seattle	21.40	18.00

ROAD OILS—Prices, f.o.b., in tank cars, 8,000 gal. minimum, 45% asphalt, per gal.:

New York	*$0.025@$0.035*
St. Louis	**.04**
Dallas	.05

Iron and Steel

PIG IRON—Furnace, per gross ton:

Birmingham, No. 2 fdry., silicon, 1.75@2.25	$12.00
Pittsburgh, basic	17.50

STRUCTURAL STEEL—Prices per 100 lb., delivered from warehouse except in Birmingham and Pittsburgh, where prices are f.o.b. mill:

	Shapes, 3 to 15-In.	Plates ¼-in.
Birmingham	$1.80	$1.80
Chicago	3.00	3.00
Cleveland	2.95	2.90
Dallas	3.90	4.00
New York	2.35	2.35
Pittsburgh	1.65	1.65
St. Louis	3.25	3.25
San Francisco	2.90	2.90

BARS, CONCRETE REINFORCING—Prices per 100 lb., delivered from warehouse except in Birmingham and Pittsburgh, where prices are f.o.b. mill, on bars rolled from billets, size ¼-in.:

Birmingham	$1.75	New York	$2.35
Chicago	2.15	Pittsburgh	*1.60*
Cleveland	2.25	St. Louis	3.15
Dallas	2.50	San Francisco	2.50

EXPANDED METAL LATH—Per 100 sq.yd., painted, delivered to job, in lots under 200 sq.yds:

Lb. per Sq.Yd.	New York	Bir-mingham	Chicago	St. Louis	Dallas	San Francisco
2.2	$15.50	$16.98	$10.10*	$12.50@$16.00	$18.00	$21.50
2.5	16.50	18.00	10.90*	13.50@ 17.00	19.50	22.50
3.0	18.00	20.00	12.25*	15.00@ 18.50	.....	25.00
3.4	19.00	21.50	13.10*	16.00@ 19.50	24.00	27.00

*More than 200 sq.yds.

WIRE REINFORCEMENT FOR CONCRETE—Plain, per 100 sq.ft., 4 in. x 4 in. mesh; manufacturers' quotations are in carloads at mills; dealers' are delivered in lots of 10,000 sq.ft. or over:

Style Number	Weight in Pounds per 100 sq.ft.	Pitts-burgh Mill	Chicago District Mill	Del. From Warehouse: New York	St. Louis	Dallas	San Fran-cisco
032	22	$0.94	$0.96	$1.32	$1.30	$1.63	$1.22*
049	28	1.20	1.23	1.67	1.70	2.00	1.55*
068	30	1.47	1.50	2.07	2.10	2.25	1.91*
093	45	1.88	1.93	2.65	2.65	2.86	2.46*
126	57	2.33	2.38	3.28	3.30	3.52	3.03*
153	68	2.78	2.84	3.92	3.95	4.20	.....
180	78	3.19	3.27	4.49	4.35	4.80	.....

*F.o.b.

STEEL SHEETS—Prices per 100 lb. for base sizes, delivered from warehouse except in Pittsburgh, where prices are f.o.b. mill:

	Blue Annealed No. 10*	Black No. 24	Galvanized No. 24
Chicago	$3.35	$3.80	$4.35
Cleveland	3.00	3.60	4.00
New York	2.65	3.50	4.00
Pittsburgh	1.85@1.90	*2.15@2.25*	*2.75@2.85*
St. Louis	3.45	3.95	4.40
San Francisco	3.65	4.15	4.65

*Light plates.

WIRE ROPE—Discounts from manufacturers' list price on regular grades of bright and galvanized, Eastern Territory, New York, and East of Missouri River.

	Base
Cast steel round strand rope	20%
Galvanized iron rigging and guy rope (add to list)	12½%
Galvanized steel rigging and guy rope	7½%
Plow steel round strand rope	35%
Round strand iron and iron tiller	50%
"Special Steel" and extra strong cast steel, round strand rope	27½%

Discount 5 points less than discount for Eastern territory: California, Oregon, Nevada, Washington, Wyoming, New Mexico, Colorado, North Dakota, Nebraska, Kansas, Oklahoma and Texas. Discount 10 points less than discount for Eastern territory: Arizona, Montana, Idaho and Utah.

RIVETS—Structural rivets, round head, ½-in., full kegs, per 100 lb., delivered from warehouse, except in Pittsburgh, where prices are f.o.b. mill:

Chicago	$4.00
Dallas	5.00
Denver	4.65
New York	4.00
Pittsburgh	2.75
St. Louis	4.15
San Francisco	5.00
Seattle	4.50

STEEL SHEETPILING—Base price, f.o.b., Pittsburgh, for large mill lots, per 100 lb. $1.90

TERNE PLATE—I C, 8-lb. coating, 20x28-in., f.o.b., Pittsburgh mill:
Per package $10.30

SHIP SPIKES—Per 100 lb., black, from dealers' warehouse stocks; galvanized are about $1.75 per 100 lb. higher:

	½-In.	⅝-In.	¾-In.
San Francisco	$5.50	$5.05	$4.90
Seattle	7.75	5.65	5.50

Pittsburgh mill base in lots of 200 kegs or more, $3.00 per 100 lb.

WIRE NAILS—Per 100 lb. keg, base, delivered from warehouse stocks; also Pittsburgh mill base:

Pittsburgh Mill	Birming-ham	Chicago	St. Louis	Dallas	San Francisco	Montreal
$1.95@$2.00	$3.30	$3.30	$2.35	$3.50	*$3.00*	$4.95

SCRAP—The prices following are, f.o.b., per ton, paid by dealers:

	New York Per Gross Ton	Chicago Per Gross Ton	Detroit Per Gross Ton
No. 1 railroad wrought	$8.75	*$8.00@ $8.50*	.....
Stove plate	*4.25@4.50*	*7.50@ 8.00*	*$5.75*
No. 1 machinery cast	*7.00*	10.50@ 11.00	7.50*
Machine shop turnings	*2.00*	*3.75@ 4.25*	*4.50*
Cast borings	*2.25*	*3.75@ 4.25*	**4.25**
Railroad malleable	8.50	*10.00@ 10.50*	*9.50*
Re-rolling rails	*7.50*	**10.50@ 11.00**	*9.00*
Misc. steel rails	.....	*8.75@ 9.25*	*10.50*
Heavy melting steel, No. 1	*5.50*	*8.50@ 9.00*	9.25
Iron and steel pipe	*6.25*	*4.00@ 4.50*	.....

*Net ton.

FREIGHT RATES—The following freight rates per 100 lb., effective May 20, 1930, apply on finished steel products in the Pittsburgh district, including plates, structural shapes, merchant-steel bars, pipe fittings, plain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished), chains, etc.:

Atlanta	$0.58*	Detroit	$0.265†
Baltimore	.27†	Kansas City	.695†
Birmingham	.58*	New Orleans	.67*
Boston	.40†	New York	.33†
Buffalo	.235†	Pacific Coast (all rail)	1.15‡
Chicago	.34†	Philadelphia	.29†
Cincinnati	.265†	St. Louis	.39†
Cleveland	.185†	St. Paul	.60*
Denver	1.15‡		

*36,000 lb. †40,000 lb. ‡60,000 lb.

Railway Materials and Supplies

STEEL RAILS—Per gross ton, f.o.b.:

	Pittts-burgh	Birming-ham	Chicago
Standard openhearth rails	$43.00	$43.00	$43.00
Light rails, 25 to 45 lb.	34.00	*33.00*	34.00@36.00
Re-rolled rails	24.00@28.00	*31.00*	34.00@36.00

RAILWAY TIES—For fair-sized orders, f.o.b., the following prices per tie hold:

		6 In. x 8 In. by 8 Ft.	7 In. x 9 In. by 8½ Ft.
New York	Long-leaf sap pine, untreated	$1.00	$1.20
	Creosoted—prices on application.		
Birmingham	White oak, untreated	.75	1.25
	White oak, creosoted	1.50	1.80
	Southern pine, untreated	.50	1.00
	Southern pine, creosoted	1.10	1.20
Chicago	White oak, untreated	1.35	1.70
	Oak, empty cell, creosoted	1.25	2.30
	Oak, zinc treated	1.55	2.05
	Southern pine, creosoted	1.45	1.90
St. Louis	White oak, untreated	.95	*1.40*
	Red oak, creosoted	*1.20*	*1.75*
	Sap pine or cypress, untreated	.70	*1.15*
San Francisco	Douglas fir, green, untreated	.59	.73
	Douglas fir, empty cell, creosoted	1.41	1.90
Montreal	Birch or maple, untreated	.75@1.25	.75@1.25
	Birch or maple, creosoted	1.20@1.30	1.50@1.60

Current Prices of Construction Materials

Railway Supplies—Continued

TRACK SUPPLIES—Prices per 100 lb. f.o.b., for large mill lots, at Pittsburgh and Chicago, together with warehouse prices at other places named:

	Pittsburgh	Chicago	Birmingham	St. Louis	San Francisco
Standard spikes, 9/16-in. and larger	*$2.70*	$2.80	*$3.45*	$3.65@$4.00	$4.10
Track bolts	3.80	3.80	4.50	4.50@ 5.00	5.10
Standard section angle bars, splice bars or fish plates	2.75	2.75	3.75	.....	.....
Tie plates	1.95	1.95	4.00	.....	.....

Pipe

WROUGHT STEEL PIPE—Discounts from standard lists for delivery from warehouse, except at Pittsburgh, where prices are f.o.b. mill:

	1 to 3-In. Butt Weld		3½ to 6-In. Lap Weld	
	Black	Galvanized	Black	Galvanized
Chicago	57.3%	44.8%	53.9%	41.4%
Cleveland	53.3%	42.3%	50.8%	37.8%
New York	56.14%	43.6%	52.72%	40.18%
Pittsburgh	64%	52.5%	61%	49.5%
St. Louis	51%	38%	48%	35%

CAST-IRON PIPE—Prices per net ton, for bell and spigot pipe, Class B and heavier, f.o.b., on regular lots of pipe:

	4-In.	6-In. and Over
Birmingham mill	$38.00@$39.00	$35.00@$36.00
Burlington (N. J.) mill	*37.00@ 38.00*	*34.00@ 35.00*
Chicago	46.00@ 47.00	43.00@ 44.00
New York	*40.00*	*37.00*
Pittsburgh	46.50@ 47.50	43.50@ 44.50
St. Louis	45.00@ 46.00	42.00@ 43.00
San Francisco	48.00@ 49.00	45.00@ 46.00

Gas pipe and Class A, $3.00 per ton extra.

SEWER PIPE—Prices delivered, per foot, for standard pipe; 6, 8 and 12-in. are single strength and 18, 24, 30 and 36-in. are double strength:

	6-In.	8-In.	12-In.	18-In.	24-In.	30-In.	36-In.
Atlanta	$0.105	$0.175	$0.315	.....	.....	.....	.....
Baltimore	.10	.30	.58	.....	$1.93	.....	$6.50
Birmingham	**.135**	**.225**	**.405**	**$0.85**	**1.625**	$3.18	4.38
Boston	.18	.28	.55	1.35	2.38	3.95	5.90
Chicago	.18	.28	.54	1.25	2.25	4.75	6.00
Cincinnati	.135	.21	.405	1.125	2.025	3.672	5.74
Cleveland	.189	.294	.567	1.35	2.43	4.824	7.38
Dallas	.23	.325	.586	1.106	1.95	3.68	5.00
Denver	.161	.23	.414	.816	1.44	.....	.....
Detroit	.18	.28	.6075	1.50	2.70	5.12	.....
Kansas City	.21	.33	.52	1.22	1.90	3.60	.....
Los Angeles	.21	.29	.52	1.186	2.03	3.39	5.09
Minneapolis	.155	.24	.50	1.15	1.85	3.45	4.60
Montreal	.30	.45	.75	1.45	2.60	.....	7.20
New Orleans	.18	.30	.54	1.02	1.95	.....	.....
New York	.17	.265	.52	1.30	2.34	4.47	6.86
Philadelphia	.0945	.147	.297	.80	1.44	2.304	3.28
Pittsburgh	.1575	.245	.54	1.25	2.25	4.68	7.17
St. Louis	.1295	*.2315*	.423	1.05	1.80	3.20	4.40
San Francisco	.21	.30	.54	1.26	2.16	3.60	5.40
Seattle	.22	.30	.54	1.26	2.16	3.50	5.50

CLAY DRAIN TILE—Prices delivered by dealers, per 1,000 lin.-ft.:

Size, In.	New York	Birm'ham	Pittsburgh	St. Louis	Dallas	San Fran.	Seattle
4	$45.00*	$56.00	$80.00	$50.00	$80.00	$67.50	$60.00
6	80.00*	112.00	110.00	85.00	110.00	112.50	112.00

*F.o.b.

Miscellaneous

LINSEED OIL—Raw oil, f.o.b., in 1- to 4-bbl. lots, per lb.:
New York.... *$0.092* Chicago.... *$0.10* Minneapolis...$0.103

WHITE AND RED LEAD—Base price per 100-lb. keg, f.o.b., New York: White, dry, $13.25; White, in oil, $13.25; Red, dry, $13.25; Red, in oil, $14.75.

CHEMICALS—Water, sewage treatment, road work, round lots in the New York market:

Sulphate of aluminum, in bags, per 100 lb	$1.25@$1.40
Sulphate of copper, in bbl., per 100 lb	4.25@ 4.50
Soda ash, 58%, in bags, per 100 lb	1.15@1.17½
Chlorine, cylinders, per lb	.04@ .06
Bleaching powder, in drums, f.o.b. works, per 100 lb	2.00@ 2.10
Calcium chloride, flaked, in drums, f.o.b. works, per ton	22.75

MANILA ROPE—The number of feet per pound for the various sizes is as follows: ¾-in., 7-ft., 6-in.; ⅞-in., 6-ft., 1-in.; 1¼-in., 4-ft., 5-in.; 1½-in., 3-ft., 8-in.; 1¾-in., 2-ft., 5-in.; 1¾-in., 1-ft., 8-in. Following prices are quoted by dealers per pound for ½-in. and larger:

Atlanta	**$0.20**	Kansas City	$0.25
Baltimore	.225	Los Angeles	.22
Birmingham	.25	Minneapolis	.19
Boston	.20	Montreal	.185
Chicago	.17	New Orleans	.22
Cincinnati	.21	New York	.19
Cleveland	.21	Philadelphia	.21
Dallas	.26	St. Louis	.175@ .18
Denver	.20	San Francisco	.175
Detroit	.215	Seattle	.175

BUILDING PAPER—Black, 50-lb. per roll of 500 sq.ft., in carloads, f.o.b., producing point $2.16

SLATERS FELT—In carloads, per roll, f.o.b., producing point $0.79

ROOFING MATERIALS—Prices, f.o.b. New York, delivered by dealers to contractors, in carloads:

Asphalt felt, per 100 lb	$3.00
Tar felt, per 100 lb	3.00
Asphalt coating, per gal	.34
Tar pitch, in 350 lb. barrels, per ton	28.00

PREPARED ROOFINGS—Prices, delivered by dealers to contractors, in carloads, f.o.b. New York, per square:

Single shingles, slate finish, sufficient to cover 100 sq.ft.	$6.12
Strip shingles, 4 in 1, hexagonal shape, with Underwriters' label	6.00
Slate surfaced roofing in rolls weighing 85 to 90 lbs	2.50

WINDOW GLASS—Discounts from list at New York warehouse:

	Single Thickness		Double Thickness	
	A Quality	B Quality	A Quality	B Quality
First 3 brackets	89%	91%	88%	90%
Larger sizes	88%	90%	88%	90%

EXPLOSIVES—Price per pound for dynamite delivered in small lots—under 200 lb.:

	Gelatin 40%	Gelatin 60%		Gelatin 40%	Gelatin 60%
Atlanta	$0.22	$0.245	Los Angeles†	$0.1875	$0.2225
Baltimore	.215	.2375	Minneapolis	.20	.225
Birmingham	*.1325*	*.1575*	Montreal	.20	.24
Boston	.225	.25	New Orleans	.195	.22
Chicago	.195*	.22*	New York	.25‡	.2725‡
Cincinnati	.22	.245	Philadelphia	.215	.24
Dallas	.2125	.2475	St. Louis	.215	.235
Denver, f.o.b.	.19	.2125	San Francisco	.155	.18
Kansas City, Mo.	.2025	.2225	Seattle	.1525	.175

*Quantities above 500 lb. but less than a ton. †San Fernando Arsenal. ‡Special gelatin in case lots.

Lumber

Prices Are Per Thousand Feet, Board Measure

New York—Timbers, No. 1 Common, rough, delivered to contractor at site of job, in Manhattan, in 20 ft. lengths and under, per M. ft., b.m.:

	Long-leaf Yellow Pine	Douglas Fir
3x4 to 8x8	*$47.50*	*$30.00*
3x10 to 10x10	*55.00*	*31.50*
3x12 to 12x12	65.00	*32.50*
3x14 to 14x14	*72.50*	*35.50*

CHICAGO—Timbers, No. 1 Common, rough, per M. ft. b.m., f.o.b., in carloads. For delivery to job from stock, in truckloads, add $10 per M. ft., b.m.:

	20 Ft. and Under Long-Leaf Yellow Pine	Up to 32 Ft Douglas Fir
3x4 to 8x8	$39.50	$37.50
3x10 to 10x10	47.00	37.50
3x12 to 12x12	58.00	37.50
3x14 to 14x14	71.00	38.50

San Francisco—Douglas fir, No. 1 Common, rough, at yards. For delivery to contractor at site of job, add $5 per M. ft., b.m.:

	10-16-18 and 20 Ft.	22 and 24 Ft
3x3 and 4	$30.00	$32.00
3x6 and 8	30.00	32.00
3x10 and 12	30.00	32.00
3x14	33.00	34.00

Other Cities—Delivered by dealers, No. 1 Common, rough, per M. ft., b.m.:

	8x8-In. x 20 Ft. and Under				3x12 to 12x12-In. 20 Ft. and Under	
	Pine	Fir	Hemlock	Spruce	Pine	Fir
Atlanta	$50.00	.....	.....	.....	$65.00	.....
Baltimore	36.00	$50.00	$53.50	*$61.00*	75.00	$50.25
Birmingham	55.00	.....	.....	.....	*58.00*	.....
Boston	51.00	45.00	47.00	48.50	57.00	42.00
Cincinnati	42.50	55.00	.....	.....	52.50	52.50
Cleveland	54.00	54.00	.....	.....	45.00	49.00
Dallas	55.00	57.50	55.00	55.00	55.00	50.00
Denver	.....	*48.00*	*48.00*	.....	.....	*50.00*
Detroit	**53.00**	**51.00**	.....	.....	*65.00*	**51.00**
Kansas City	36.00	*36.50*	*36.50*	.....	*55.00*	**42.00**
Los Angeles	.....	43.50	.....	.....	.....	45.50
Minneapolis	.....	46.25	.....	.....	.....	46.25@47.75
Montreal	.....	.....	.....	40.00	40.00	.....
New Orleans	40.00	40.00	.....	45.00	65.00	60.00
Philadelphia	48.00	42.00	41.00	46.00	58.00	42.00
Pittsburgh	53.00	57.00	65.00	66.00	43@57	57@60
St. Louis	*49.00*	39.00	39.00	.....	*57.00*	*40.00*
Seattle	.....	18.00	.....	.....	.....	17.00

	1x10 In. x 16 Ft. and Under			2x10 In. x 16 Ft. T. & Gr.	
	Pine	Fir	Hemlock	Pine	Fir
Atlanta	$55.00	.....	.....	$40.00	.....
Baltimore	*54.00*	*$44.00*	*$43.75*	.....	.....
Birmingham	*40.00*	.....	.....	45.00	.....
Boston	46.00	40.00	42.00	48.00	$44.00
Cincinnati	45.00	47.50	.....	35.00	45.00
Cleveland	65.00	54.00	.....	42.00	54.00
Dallas	60.00	.....	.....	55.00	.....
Denver	.....	*36.00*	*36.00*	.....	*42.00*
Detroit	47.00	44.00	.....	45.50	44.50
Kansas City	*45.00*	*35.00*	*35.00*	**35.00**	**33.00**
Los Angeles	40.50	40.50	.....	.....	48.50
Minneapolis	65.00*	40.00	.....	45.00*	39.00
Montreal	*45.00*	50.00	40.00	.....	55.00
New Orleans	40.00	40.00	.....	54.00	48.00
Philadelphia	50.00	42.00	40.00	53.00	42.00
Pittsburgh	40.00	47.00	55.00	40.00	50.00
St. Louis	*39.00*	*39.00*	*39.00*	*43.00*	*40.00*
Seattle	.....	17.50	.....	.....	16.00

*Northern Pine, No. 2 Com.

PILES—Prices of Nichols Bros., 90 West St., N.Y.C., per lineal foot, pine, with bark on, f.o.b., New York; delivered from barge, 1½ to 2c. per ft. additional:

Dimensions	Points	Length	Barge	Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.12	$0.165
12 in.—2 ft. from butt	6 in.	50 to 59 ft.	.165	.215
12 in.—2 ft. from butt	6 in.	60 to 69 ft.	.19	.235
14 in.—2 ft. from butt	6 in.	50 to 69 ft.	.225	.345
14 in.—2 ft. from butt	6 in.	70 to 79 ft.	.2425	.295
14 in.—2 ft. from butt	5 in.	80 to 85 ft.	.305	.395
14 in.—2 ft. from butt	5 in.	85 to 89 ft.	.345	.435

CONSTRUCTION NEWS

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WATERWORKS

PROPOSED WORK

Calif., Oakdale—For 100,000 gal. tank for additional water storage.

Calif., Oceanside—Oceanside Mutual Water Co., dam and reservoir, 40 ft. high, near Calavera, east of Carlsbad. $160,000.

Mass., Belchertown—Commonwealth of Massachusetts, wells, standpipe, grading, drainage, at Belchertown State Hospital. $20,000. Tighe & Bond, 189 High St., Holyoke, engrs. Noted May 7.

Mass., Cambridge — City, additional piping from Stony Brook Reservoir to Fresh Pond Reservoir, $225,000; new 12 in. watermains for East Cambridge section in connection with additional water supply; Water Dpt., additional filter bed at Fresh Pond Reservoir, $100,000. Engineer not selected.

Mass., Medfield—Commonwealth of Massachusetts, Dpt. Mental Diseases, preliminary surveys water supply, Town and State Hospital. $200,000. Town votes acceptance and aid to project. P. Pederzini, Main St., chn. Water Comn., Town Hall. J. J. Van Valkenburgh, Irving Sq., Framingham, engr.

Mass., Weston—Town, Water Comn., water standpipe. $15,000 or more. Metcalf & Eddy, Statler Bldg., Boston, engrs.

N. J., Montclair—Town Comn., Town Hall, mains in Watchung Plaza, Washington, Fairfield and Inwood Aves. $15,000. W. Warnock, town engr.

O., Zanesville — New standpipe on Putnam Hill, installing new mains. $100,000. **Maturity this year.**

Okla., Blanchard — City Council preliminary plans extending 15,800 ft. 2- to 6-in. c.i. mains. $15,000. P. V. Baker, mayor.

Okla., Braman—City Council preliminary plans additional drilled well water supply. $15,000. S. Orr, mayor.

Okla., Guthrie — City Council preliminary plans repairs and additions to filtration plant. $40,000. E. Geddes, Guthrie, engr.

Okla., Shawnee — City Council preliminary plans additional drilled wells, pumping equipment. $25,000. F. D. Brown, Shawnee, engr.

Tex., Houston — City, c/o W. E. Monteith, feeder mains from Northeast Pumping Plant on Adalia St. from Staples to Gregg Sts., Staples St. from Adalia St. to plant and Gregg St. between Adalia and Combell Sts. $73,000 appropriated. J. M. Nagle, Houston, city engr.

Va., Charlottesville—City Council Goose Egg Rock Storage Dam on Moormans River. $280,000. Saville & Williamson, Inc., Electric Bldg., Richmond, engrs.

Ont., Bothwell—Town, deep well system, standpipe, installation mains, house services, $25,000 up.

Ont., Omemee—Town, waterworks, incl. wells, pumping equipment, c.i. mains, valves, hydrants, house services. $40,000. A. W. Connor & Co., 106 Highlands Ave., Toronto, engr.

Ont., Pembroke—Town, waterworks extensions, incl. 6 in. and up c.i. mains, valves, hydrants, house services, $38,000. J. P. Howe, Pembroke, engr.

Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue.

Location	*Project*	*Cost*	*Status*
Waterworks			
San Francisco	Pipe Line	$4,046,479	Contract
Louisville	Reservoir and pipe Line	965,489	Contract
Seattle	Reservoirs, pipe line, etc.	2,000,000	Bids asked
Sewers			
Dallas	Sewage disposal	1,700,000	Proposed
Bridges			
Chicago	Bridges, viaducts, etc.	7,500,000	Proposed
Railways			
Oklahoma	Track elevation and station	5,000,000	Proposed
Grade Crossings			
Illinois	Grade elimination	3,750,000	Proposed
Sports and Parks			
Redwood City, Calif.	Racing course	1,000,000	Proposed
Toronto (Ont.)	Arena	1,250,000	Contract
Federal Government			
Kansas City (Mo.)	Post office	2,330,000	Contract
Grain Elevators			
Albany (N.Y.)	Grain elevator	1,500,000	Proposed
Unclassified			
Kansas	Oil pipe line	1,500,000	Proposed
Buildings			
Illinois	Tourist hotels	1,040,000	Bids asked
Seattle	Hotel	1,000,000	Bids asked
New York	Church	1,250,000	Proposed
Pittsburgh	Church	3,000,000	Proposed
Detroit	Club	1,400,000	Proposed
Los Angeles	Office	1,750,000	Proposed
Boston	State office	1,000,000	Proposed
Jamaica (N.Y.)	Armory	1,750,000	Proposed
New York	Art museum	3,350,000	Proposed
New York	Health office	4,720,000	Proposed
Philadelphia	County building	3,000,000	Proposed
Quincy (Ill.)	High school	1,198,858	Contract
Nashville (Tenn.)	Theatre	1,250,000	Bids asked
St. Louis	Telephone exchange	1,860,000	Contract
Warehouses			
Weehawken (N.J.)	Poultry terminal	1,250,000	Contract

BIDS ASKED

Calif., Anaheim—June 9, by E. B. Merritt, city clk., furnishing, installing 1,000 g.p.m. deep well turbine pump against total head of 280 ft. or 1,500 g.p.m. against 200 ft. head, bowl installed in well 160 to 170 ft. below surface.

Mass., Provincetown—June 11, Bd. Water Comrs., Town Hall, 42 x 105 ft. steel standpipe, concrete found. for water tank. Whitman & Howard, 89 Broad St., Boston, engrs.

Mont., Helena—See "Contracts Awarded."

New Jersey—June 15, by Passaic Valley Water Comn., 158 Ellison St., Paterson, 12,500 ft. 34- to 36-in. steel, c.i. or cylinder concrete pipe line, Contr. 5: 6,400 ft. 20- and 24-in. c.i. pipe line, Contr. 6. J. Wilson, pres.; adv. E.N.-R. June 4.

N. Y., Dannemora—June 30, by Dpt. Correction, Albany, additional water supply (pump house, chlorinator house, etc.) at Clinton Prison and Dannemora State Hospital. W. N. Thayer, Jr., comr.; adv. E. N.-R. June 4.

N. Y., New York — June 9, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in 242nd St., Caeser and Dash Pls., Colden, Edson, Gunther, LaSalle, Livingston, Megry, Paulding, Powell, Tillotson and Waring Aves., Bronx Boro; mains in Columbus Ave. and West 74th St., Manhattan Boro.

N. D., Grand Forks—June 10, by City, 2 pumps with motors, vertical multiple stage turbine type, each to elevate 800 g.p.m. against total head 54 ft., 2 pumps and motors of vertical type 800 g.p.m. against total head 12 ft.

O., Cleveland—June 5, by City, one 2 m.g.c. and two 1 m.g.c. steel plate storage tanks. L. A. Quayle, City Hall, engr.

Pa., Newell—June 5, by Bd. Educ., Jefferson Twp., C. H. Harris, pres., 1,345 ft. 2 in. water line, 1 meter, 1 meter box, fittings, two 30 in. diam. Type S filters, 25 lb. alkalinity pot, 25 lb. alum chemical pot. Brownsville Eng. Co., 5 Snowden Bldg., Brownsville, engrs.

Wash., Seattle—Mountain Lakes Water Co., 10107 Woodland Park Ave., bids about June 10, 24 mi. 24- to 42-in. wood-stave and steel pipe; 8 mi. 18- to 24-in. distribution mains; cross mains, 4- to 6-in. laterals, 2 reservoirs. $2,000,000. Ulen & Co., 120 Bway., New York, engrs. Noted Apr. 16.

CONTRACTS AWARDED

Calif., San Francisco—S. J. Hester, secy. Bd. P. Wks., City Hall, constructing San Jose Valley Pipe Line in San Joaquin Div. Hetch Hetchy Aqueduct, Hetch Hetchy Contr. 123, for City and San Francisco Co., to Youdall Constr. Co., Matson Bldg., $4,046,479. Noted May 14.

Ill., Westchester — City Council, to C. M. Porter Co., 228 North La Salle St., Chicago, 6 and 8 in. c.i. water pipe extension $10,362. 8- to 15-in. vitr. tile storm sewers $6,772. 10 in. vitr. tile sanitary sewers $3,423. Grand total $20,557.

Ia., Osceola—Great Lakes Pipe Line Co., Fairfax Airport, Kansas City, Kan., oil pumping station, reservoirs, two 30,000 bbl. capacity and two 11,300 bbl. capacity tanks, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill., grading, to J. Utterback, Osceola.

Ky., Louisville—Louisville Water Co., excavating and constructing 30 m.g. shallow concrete covered reservoir, to George M. Eady Co., 340 Byrne St., Cannell-Conrad Constr. Co., Equitable Life & Casualty Bldg., and Henry Bicknel Co., 6th and Lee Sts., $305,489; 48 in. concrete pipe line from reservoir to Crescent Hill Pumping Station, to Lock Joint Pipe Co., Ampere, N. J., $660,000. Est. $1,660,000. Noted Apr. 30.

Md., Cumberland—Mayor, Cumberland, dam site in Valley of Evitts Creek, Bedford Co., Pa., to Vang Constr. Co., Grant Bldg., Pittsburgh, Pa. and Cumberland, $772,925. Noted May 21.

Mich., St. Joseph—City, general contract 4 m.g. filtration plant, pumping station, to Lovering-Longbothom Co., Ann Arbor, $129,640. Noted May 7.

Mont., Helena—For (1st unit) 217 x 240 ft. concrete settling basin, 11 ft. deep, day labor. $32,000. Total $200,000. T. Bogy, city engr. Noted July 31.

N. Y., Brooklyn—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Avenues T and U, to Ialanti

See proposal advertising on page 127

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LEADITE

Trade Mark Registered U.S. Pat. Office

Laying 30 in. cast iron pipe under paved street, with LEADITE Joints.

Under Paved Streets

When water mains are laid under modern, well paved streets,—the idea of permanence is usually foremost in mind,—because, to dig-up such streets for repairs, is not only extremely costly, but apt to cause traffic congestion, tie-ups or re-routing.

When the Bell and Spigot water line joints are made with LEADITE,—good, tight, durable and permanent joints result.

Thousands of miles of bell and spigot pipe are jointed with LEADITE,—and a lot of this huge total lies beneath the surface of modernly paved streets, throughout this Country and in many overseas Countries.

The pioneer self-caulking material for c.i. pipe.
Tested and used for over 30 years.
Saves at least 75%

THE LEADITE COMPANY
Land Title Building, Philadelphia, Pa.

No Caulking

Waterworks (Continued)

Bros., Bay St., St. George, $5,100. Noted May 14.

N. Y., Long Island City—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in 23rd, 25th and 44th Sts., to L. D. Gregory, 351 East 124th St., New York, $12,742; in 48th St., to S. Gallucci, 33 Railroad Ave., Corona, $7,281. Noted May 14.

N. Y., New York—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in Columbus Ave., to Atlas Water Wks. Corp., Huntley Ave., $90,337. Noted May 14.

N. D., Grand Forks—City Council, furnishing, installing 11,192 lin.ft. 12 in. c.i. mains, thirty 12 in. gate valves, to Starbuck Constr. Co., Starbuck, Minn., $30,527. Noted Apr. 30.

Pa., Bellevue—Ross Twp. water lines in Ross Twp., to Bloomfield Constr. Co., 4828 Yew St., Pittsburgh, $11,324.

Pa., Phila.—Dpt. P. Wks., Bureau Water, City Hall Annex, A. Murdock, dir., Cont. 1026, incl. check valves for Belmont Pumping Station, two 30 in. flanged cone check valves, to Automatic Cone Valve Co., 228 North La Salle St., Chicago, Ill., $20,000; Contr. 1025, steel pipe, fittings, to Acme Machine Co., 27 North 38th St., $4,300. Noted May 14.

Tex., Vega—City, c/o C. C. Wimberly, mayor, V. Shields, secy., 13,610 ft. 4- to 8-in. c.i. pipe, tank, tower, for waterworks, to Asplund Constr. Co., Fisk Bldg., Amarillo, $20,235. Est. $25,000. Noted May 7.

Wis., Milwaukee—Mains in West Wells St., to General Contractors, Inc., 4728 Lisbon Ave., $2,470; East Center St., to Milwaukee Sewer & Drain Co., 928 Humboldt Ave., $5,170; South Muskego Ave., to Wenzel & Henoch Co., 5025 State St., $7,862. Grand total $15,502.

Wis., Milwaukee—Mains in North 35th St., to Werner Co., 721 8th Ave., Wauwatosa, $33,204.

B. C., Vancouver—City Council, furnishing eighty 8 and 12 in. flanged gate valves (British made), to Seith Murray & Co., Ltd., 510 Hastings St. W., $2,708; five hundred 6 to 12 in. hub end gate valves (Canadian made), to Jenkins Boothens Valves, Ltd., 1084 Homer St., $11,200. Noted Apr. 30.

SEWERS

PROPOSED WORK

Calif., Capistrano Beach—City Council Imhoff tank and sprinkling filter in Capistrano Beach Sanitary Dist. $30,000. Burns-McDonnell-Smith Eng. Co., Western Pacific Bldg., Los Angeles, engrs.

Calif., Laguna Beach—City Council sewerage system. $25,000 or more. Currie Eng. Co., Anderson Blk., San Bernardino, engrs.

Calif., Los Angeles—Bd. P. Wks., City Hall, 33,671 ft. 8- to 21-in. cement sewers, manholes, junction chambers in Verdun Ave. and 60th St. Sewer Dist. To exceed $90,000. City Eng. Dpt., c/o Bd. P. Wks., engrs.

Calif., San Jacinto—City Council sewerage system. $25,000 or more. Currie Eng. Co., Anderson Blk., San Bernardino, engrs.

Ind., Danville—Town Bd. sewage disposal plant. $47,000.

Ind., Ft. Wayne—Bd. P. Wks., 2 mi. Southwood Park Sewer, from Bway. to Rudisill Blvd. eastward to Hoagland Ave. $111,000. W. J. Hosey, mayor.

Mass., Boston—For 10- to 15-in. pipe surface drain in Centre St., West Roxbury, $28,690 appropriated. J. A. Rourke, Dpt. P. Wks., comr.

Mich., Bay City—For 3 main interceptors, 1 in Banks Dist. and 2 on east side from 38th St. and from Atlantic St. to river crossings, incl. sewer extensions, interceptor sewers, relief sewers, sanitary sewers, pumping plant, force mains. $250,000. Menefee & Dodge, Ann Arbor, engrs.

Nev., Las Vegas—City, Sewer extensions. $150,000. W. L. Benham Co., Kansas City, Mo., engrs.

N. J., Haledon—Bd. Boro Council, Boro Hall, sanitary sewer in Mountainside Ave., $25,000. Schilling & Spinner, 242 Muir St., Paterson, boro engr.

N. J., Hasbrouck Heights—Bd. Boro Council, Municipal Bldg., preliminary plans altering and renovating municipal sewage disposal plant. $25,000 or more. Watson, Lanning & Rudolph, c/o owner, engrs. Noted Feb. 26.

N. J., Newark—Bd. City Comrs., storm water sewerage system in Morris Canal, near Lockwood St. from Lockwood St. to Lister Ave. to Passaic River. $145,000. J. Costello, city engr.

N. J., Westfield—Town Council, Town Hall, preliminary plans storm sewers from South Ave. and Livingston St. through Central R.R. right-of-way to connect with flume along St. Paul St. $65,000. J. Hopkins, town engr. Noted May 14.

N. Y., Brooklyn—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., New York, and Office Engineer Park Dpt., Prospect Park, storm water drains in Marine Park, north of Avenue U. $90,000. **Maturity soon.**

Okla., Oklahoma City — Preliminary plans storm sewers in sections 4th, 5th, 6th and Hanson Sts. $30,000. G. F. Brown, City Hall, engr.

Pa., Lancaster—City Council bids in July 36- to 96-in. concrete trunk lined sewer. $1,000,000. J. N. Chester Engineers, Clark Bldg., Pittsburgh, engrs. Noted Feb. 13, 1930.

R. I., Providence—City, sewerage works in Rabbitt Rd., Bristol Ave. Iona, Byfield and Rugby Sts. $25,000 or more.

Tex., Dallas — City, c/o E. Goforth, secy., ordered W. S. Tanner, sewerage engr., Dallas and Hawley, Freese & Nichols, consult. engrs., Caps Bldg., Fort Worth, to complete plans 2 bar screens, 2 primary clarifiers, equipments, 4 digesters, about 6 air compressors, 5 final clarifier equipments. $1,700,000. Noted Dec. 18.

Wis., Milwaukee — Metropolitan Sewerage Comn., pumps, motors, controls, pipe for Port Washington Road Sewage Booster Station, to Amer. Well Wks., Aurora, Ill., $10,020.

Ont., Chatham—For 21 in. storm sewer in Lacroix St., $13,929; vitr. tile sanitary and combined sewerage system in area of Queen St. to Thames River, with outlet at Robertson Ave., $106,762. T. M. S. Kingston, City Offices, engr.

Ont., Hamilton—For 8 in. and up vitr. tile sewers in Main St., $3,854, Strouds Lane, $11,782; and at pumping station, West Hamilton, $19,946. W. L. McFaul, City Hall, engr.

Ont., Hamilton—City, sewage disposal plant, probably activated sludge, rein.-con., in west end, $440,000; also pump house, force main, in connection with same, $183,000. W. L. McFaul, City Hall, engr.

Ont., Sault Ste. Marie—A. Russell, city engr., preparing report, estimates sanitary and storm sewer extensions, and granolithic sidewalks, $50,000.

Ont., Waterloo — Town, preparing plans and takes bids about June 8, 8,000 ft. new main from old disposal plant to Grand River, $34,000; also additional settling beds, $45,000. James, Proctor & Redfern, 36 Toronto St., Toronto, engrs.

Sask., Weyburn—I. C. Meade, engr., Regina, soon takes bids sewage disposal plant, $32,000.

BIDS ASKED

Conn., Hartford—June 10, by State, sewerage system at Cedarcrest Sanatorium, $60,000. Henry Robinson Buck, Inc., 650 Main St., engrs. Noted Apr. 2.

Conn., Stamford—June 8, by Common Council, storm sewers, additional manholes in present sanitary sewers, concrete curbing, 8 in. rein.-con. paving Davenport St., from Greenwich Ave. to Selleck St. and portion of Selleck St., from Davenport to Greenwich Ave.; adv. E. N.-R. June 4.

Ill., Chicago — June 16, by North Shore Sanitary Dist., Waukegan, additions sewage treatment plants at Lake Forest and North Chicago, new sewage treatment plant at Highland Park, Greeley & Hansen, 6 North Michigan Ave., Chicago, engrs.

Ill., Galena—See "Streets and Roads."

N. J., Boonton—June 24, by Bd. Sewerage, at Town Office, 714 Main St., sewers, appurtenances, Clyde Potts, 30 Church St., New York, consult. engr.; adv. E.N.-R. June 4.

O., Cleveland—June 10, by City, 2nd sect. Big Creek Intercepting Sewer, to Bellaire Ave. $75,000. R. Hoffman, City Hall, engr.

Pa., Altoona—See "Contracts Awarded."

Pa., Castle Shannon—June 9, by R. W. Hoffman, secy. Pittsburgh Railways, aud., 10,500 lin.ft. 8 in. terra cotta pipe, 50 lin.ft. 10 in. c.i. pipe, 400 lin.ft. 6 in. terra cotta pipe, 45 manholes, 26 lampholes. Vegeier Ramsey Co., 208 Bowman Bldg., Pittsburgh, engrs.

Pa., Phila.—June 10, by Dpt. P. Wks., Bureau of Eng. & Surveys, City Hall Annex, A. Murdock, dir., Schedule A, branch sewers in Bigler St., from Alder to Warnock Sts., 4th St., from Oregon to Shunk Sts., Hegerman St., from Hellerman to Levick Sts., Large St., from Glendale to Hertel Sts., Merrick St., from Cresson to Dobson Sts., 20th St., from Olney to Thorpe Lane, Windrim St., from Wayne to Germantown Sts.; Schedule B, sewage disposal project, incl. Main Gravity Interceptiing Sewer in Mingo Ave., from Penrose Ave. to Mingo Creek.

Wash., Seattle—Bd. P. Wks. bids about June 12, sewers in 13th and 14th Aves. S. W. $84,483. R. H. Thomson, city engr.

CONTRACTS AWARDED

Ill., Westchester—See "Waterworks."

Ia., Cedar Rapids — L. J. Storey, city clk., West Side Sanitary Sewer Intercepter, Sect. A, 605 ft. 27 in. cradled vitr. sewer, 2,604 ft. 42 in. and 240 ft. 48 in. concrete or segmental block sewer, 300 ft. 48 in. corrugated iron river outlet, 6 standard manholes, 4 special manholes, and Sect. B, two 30 in. c.i. pipe river crossings, 240 ft. bank, 335 ft. across river channel, 2 large control manholes, to D. Christensen Rockwell, $64,782; Sect. C, 36 x 72 ft. pumping plant, buttressed concrete below flood line, brick and concrete above line, to J. W. Hopp Constr. Co., Granby Bldg., Cedar Rapids, $44,668; Sect. D, furnishing, supervising, installing two 8,800 g.p.m., one 500 g.p.m. and one 200 g.p.m. pumps, to Crane Co., 321 1st St. S. W., $5,000; Sect. E, electrical work in and around pump house, to Fowler Electric Co., 218 3rd St. S. E., $4,100. Grand total $118,550. Noted Apr. 23.

Ky., Winchester—City Council, N. A. Powell, street comr., 58 South Main St., complete sanitary and storm sewerage systems, to Bishop & Robertson Co., Ashland, $115,000.

Md., Baltimore—Bd. Awards, sanitary sewers and storm drains in Storm Water Contr. 164, incl. 2,472 lin.ft. 24- to 33-in. rein.-con. pipe drains, 4,233 lin.ft. 12- to 27-in. vitr. pipe drains, 4,965 lin.ft. 8 and 10 in. vitr. pipe sewer, 508 vertical ft. standard manholes, to Thompson Contg. Co., Relay, Md. $33,973.

Mass., Marblehead — Town, Sewer Comn., Town Hall, 4,000 ft. 6 and 8 in. sewer connections, to A. Daddario & Son, 48 Rockdale St., Mattapan, $26,739. Est. $35,000.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in Delamere Pl., to Alvon Contg. Co., 2771 Nostrand Ave., $7,366; West 3rd St. and Atkins Ave., to S. Guerriero, 1024 66th St., $2,865 and $2,057 respectively; DeWitt Ave., to J. Losciabo, 2315 Avenue U, $776 and West 3rd St., to Coprib Contg. Co., 1215 82nd St., $6,650. Grand total $19,714. Noted Apr. 30.

O., Garfield Heights (br. Cleveland)—For 6,000 ft. 18- to 48-in. concrete trunk sewer in Impvt. 11, Sects. 1 and 2, to Rossi Marcelletti Co., 11700 Willard Ave., Cleveland, $51,779. Noted Apr. 23.

Pa., Altoona—City Council, repairing, extending filter beds, new filter strata, 1 mi. per acre of 4 and 6 in. tile underdrain for 30 acres 6th Ave. about 2 mi. from city line, own forces. H. J. Baum, City Hall, engr.

Pa., Phila.—Dpt. P. Wks., Bureau Eng. & Surveys, City Hall Annex, A. Murdock, dir., branch sewers in Mildred St., from Reed St. to point 110 ft. south, Pacific and Balfour Sts., from Balfour to Pacific St., to Corrodo & Troselone, 6045 Magnolia St., $981 and $3,194 respectively—branch sewers in 11th St., from Locust to Spruce Sts., to A. Frunzi, 513 High St., $8,042; Emerald St., from York to Cumberland Sts., to Pizogna & Hirsh, 207 South 15th St., $1,633; Front St., from Moore to Mifflin Sts., to De Sepio & Vallone, 28th and Wolf Sts., $7,689; Hunting Park Ave., from K to M Sts., and Knorr St., from Charles to Hawthorne Sts., to A. DiSandro & Son, 6400 North 5th St., $14,917, and $16,850 respectively; Marshall St., from Willow to Spring Garden Sts., to V. Ventresco, 6113 Moss St., $15,190; Memphis St., from Ontario to Venango Sts., to Campellone & Diovic, 3856 North 10th St., $11,760; Shelbourne St., from Annsbury to Wyoming Sts., to Leva Bros., 104 West Gale St., $8,557. Grand total, $88,813. Noted May 7.

R. I., Providence—Screening plant, to C. B. Maguire, 507 Grosvenor Bldg. Est. $25,000.

Tex., Austin—City, c/o R. R. Johnson, mgr., 37,550 ft. 6 and 8 in. vitr. clay sanitary sewers, 90 manholes, to W. G. Cullum & Co., Allen Bldg., Dallas and Austin. $44,307. Noted May 7.

Wash., Seattle—Bd. P. Wks., Charleston Street unit Lake Washington Intercepting Sewer, to Queen City Constr. Co., 603 18th Ave. S. $169,190. Noted June 4.

Wis., Arcadia—R. H. Hohman, city clk., sewerage system, disposal plant, to Ofelt & Mariani, 537 East Minnehaha St., St. Paul, Minn., $67,269. Noted Feb. 19.

WASTE DISPOSAL

PROPOSED WORK

N. J., Kearny (sta. Arlington)—Bd. Town Council, Town Hall, municipal incinerator, $150,000. Project in abeyance. Noted Apr. 2.

BIDS ASKED

O., Cleveland—June 5, by City, furnishing treater tank for garbage disposal plant and 1 oil cooler for Div. Water & Heat.

Pa., Altoona—June 11, by City, refuse incinerator, water jacketed type, complete with preheater, chimney, building, with rated capacity 3.6 tons wrapped garbage per hr. $50,000. H. J. Baum, city engr.

Ont., Hamilton—Bids about June 15, 3 story 124 x 133 ft., rein.-con. incinerator, Plymouth and Depew Sts. $300,000. W. J. Walsh, 304 Terminal Bldg., archt.

BRIDGES

PROPOSED WORK

Calif., Knights Landing—Bd. Comrs. Yolo Co. (Woodland), bridge over Sacramento River. Project to be financed by Yolo and Sutter Joint Hy. Dist. $186,285. E. Von Geldern, Yuba City, engr.

Calif., Los Angeles—Bd. Supervs. Los Angeles Co., cancelled bids to have been opened May 18 due to revised specifications, widening bridge over Santa Anita Wash, on Huntington Dr.

Ill., Chicago—South Park Comrs., 5700 Cottage Grove Ave., preparing plans and bids early in August, 1,500 ft. filled approaches 140 ft. wide with retaining walls, from Montrose to Randolph Sts., connecting with viaduct 1,431 ft. long, 140 ft. wide at Field Blvd., to East Wacker Dr., 879 ft. long, 140 ft. wide, connecting with Outer Drive Bridge—900 ft. dock along Wacker Dr. Viaduct on River side—2,986 ft. viaduct, 128 ft. wide, along Randolph St., structural steel encased in cement, heavy enough to provide for lower roadway should same become desirable in near future. $7,500,000. L. White, 5700 Cottage Grove Ave., engr.

Mass., Chicopee—City, F. P. Cobb, engr., soon takes bids rein.-con., steel bridge over Chicopee River. To exceed $25,000. E. A. Annable, 145 State St., Boston, engr. Noted May 7.

Mass., Springfield—City, J. W. Cunliffe, concrete, steel bridge over Water Shops Pond, near Wilbraham Rd. $25,000 plus.

N. J., Clifton—Bd. Freeholders Hunterdon Co., Court House, Flemington, concrete bridge over Halstead St. $25,000. **Maturity probably soon.**

N. J., Pottersville—Bd. Freeholders Somerset Co., Somerville, concrete bridge. $25,000. **Maturity probably soon.** M. Smith, Court House, Somerville, co. engr.

Oklahoma—State Hy. Dpt., Oklahoma City, preliminary plans 114 ft. rein.-con. bridge at Colgate, Coal Co., $25,000—120 ft. rein.-con. bridge, at Canton, Blaine Co., $30,000—8 span 120 ft. rein.-con. bridge, at Connerville, Johnson Co. $30,000. A. R. Losh, hy. engr.

Tex., Schertz—Bexar Co., (San Antonio) and Guadalupe Co. (Seguin), preliminary plans 170 ft., rein.-con., steel high water bridge, 24 ft. over Ciblo Creek, near here. $35,000. Address W. E. Goodson, San Antonio, engr. Bexar Co.

Texas and Mexico—State of Texas and Mexican Government, free bridge over Rio Grande River near McAllen, Tex., and Reynosa, Mex. $60,000 or more. Address State Dpt.

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Bridges (Continued)

Wash., Seattle—Bd. P. Wks. bids early in June, viaduct, grading, paving, viaduct approaches Albro Place Project. $325,000. R. H. Thomson, city engr.

Ont., Toronto—For 400 to 600 ft. concrete or concrete, steel hy. bridge connecting Mount Pleasant Ave. at Blythwood Ave. with Lawrence Park Dist. $200,000. R. C. Harris, City Hall, engr.

BIDS ASKED

California—June 10, by C. H. Purcell, engr. State Hy. Comn., Sacramento, 9 timber bridges, widening 2 concrete bridges on road between Stockton and Turner Station, San Joaquin Co.

Calif., San Rafael—June 9, by R. E. Graham, clk. Marin Co., rein.-con. bridge at Stewart Ranch on Nicacio Rd., incl. 186 cu.yd. Class A concrete, 21,000 lb. reinforcing steel.

Illinois—June 16, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, rein.-con. substructure, two 60 ft. rein.-con. girder approach spans, 230 ft. steel superstructure, Route 1, Sects. KB-2 and KC-2, Dist. 1, Cook Co.—40 ft. steel I-beam bridge extension, Route 24, Dist. 4, Sect. L-B, Tazewell Co.—44 ft. rein.-con. girder bridge, retaining walls, Route 53, Sect. 533H—fifteen 50 ft. span rein.-con. bridge, retaining walls, Route 53, Sect. 534H—eleven 51 ft. span rein.-con. bridge, rein.-con. culvert, Route 54, Sect. 543H-1—three 44 ft. span rein.-con. girder bridge. Route 64, Sect. 130H, all Dist. 1, DuPage Co.—two 124 ft. span steel, concrete bridge, retaining walls, paving approaches, Route 54, Sect. 541H, DuPage and Cook Counties—two 40 ft. span rein.-con. girder bridge, six 30 ft. span rein.-con. slab bridge, 3 rein.-con. box culverts, Route 89C, Sect. 105B, Marshall and Putnam Counties—three 45 ft., one 50 ft. and three 30 ft. span rein.-con. girder bridges, Route 100, Sect. 123B, Dist. 8, Calhoun and Pike Counties—rein.-con. substructure, 80 ft. steel superstructure, Route 104, Sects. 141-B and C, Dist. 1—45 ft. rein.-con. girder bridge, Route 124, Sect. 101B—three 45 ft. and twelve 43 ft. span bridge extensions, thirteen 43 ft. span steel I-beam bridge, rein.-con. substructure, Route 124, Sect. 102B—200 ft steel superstructure, Route 124, Sect. 102C, all Sangamon Co.—five 20 ft. span steel I-beam bridge, concrete piles, rein.-con. substructure, Route 145, Sect. 104-B—120 ft. steel superstructure, Route 146, Sect. 104-C, both Dist. 9, Union Co.—raising, widening seven 15 ft. span timber bridge, Route 146, Sect. 111V-B Dist. 9, Johnson Co.—six 50 ft. I-beam approach spans, rein.-con. substructure, 150 ft. steel superstructure, Route 147, Sect. 115B and C, Dist. 9, Johnson and Pulaski Counties—2 rein.-con. substructures, 2 girder approach spans Route 148, Sect. 129-B, Williamson Co.—55 ft. rein.-con. girder bridge, Route 173, Sect. 133X-B, Dist. 1, McHenry Co. F. T. Sheets, engr.

Ill., East St. Louis—July 8, by Bd. Trustees East Side Levee & Sanitary Dist., 217 Metropolitan Bldg., two 65 ft. and one 130 ft. span rein.-con. steel bridge over Construction Project 8, also double 10 x 5½ ft. culvert 90 ft. long, State Aid Project 39. E. F. Harper, c/o owner, ch. engr.

Ill., McLeansboro—June 8, by Bd. Comrs. Hamilton Co., rein.-con. steel bridge, Sect. 9B-M.F.T.—3 rein.-con. steel bridges, 1 rein.-con. box culvert, Sect. 6B, 7B and 10B-M.F.T. —rein-con. box culvert, Sects. 2B, 3B, 4B and 8B-M.F.T. G. H. Baker, c/o State Hy. Dpt., Springfield, engr. county roads.

Ill., Newton—June 12, by Bd. Comrs. Jasper Co., 2 bridges, 26 rein.-con. box culverts, Sect. 2-2-M.F.T.; 11 rein.-con. box culverts Sect. 2-1-M.F.T. G. H. Baker, c/o State Hy. Dpt., Springfield, engr. county roads.

Iowa—June 9, by State Hy. Comn., Ames, 70 x 24 ft. plate, girder bridge, 1 culvert, Rd. 74 near Davenport, P-762 Scott Co.—55 culverts, extensions, Rd. 99 near Bellevue, B-699 Jackson Co.—32 culverts, extensions, Rd. 18 near Spencer, B-259 Clay Co.—five 54 x 24 ft. I-beam span overhead crossing over Wabask R.R. near Tracy, Rd. 2, X-752, Marion Co. C. R. Jones, aud.

Kansas—See "Streets and Roads."

Louisiana—June 30, by State Hy. Comn., Baton Rouge, bridges in Rapides, Ouachita, Bossier, Caddo, La Salle, and Natchitoches Parishes, H. B. Henderlite, ch. engr.; adv. E. N.-R. June 4.

Michigan—June 9, by A. L. Burridge, div. engr., Cadillac, MB 1 of 60-2-1, Contrs. 1 and 2, 2 rein.-con. abutments, steel deck girder, rein.-con. flooring, two 1½ ft. sidewalks, Montmorency Co., for State Hy. Comn., Lansing.

Michigan—June 10, by H. W. Hagaman, div. engr., 504 Eddy Bldg., Saginaw, Br. 1 of 56-12-8, Contrs. 1 and 2, 2 rein.-con. abutments, steel deck girder, two 2½ ft. sidewalks, concrete flooring and wearing surface, Midland Co., for State Hy. Comn., Lansing.

Mich., Port Huron—June 16, at office E. C. Fitzpatrick, city clk., Contrs. 1 and 2, substructure and superstructure bascule bridge over Black River, on 7th St.; adv. E. N.-R. June 4.

N. J., Egg Harbor—June 10, by Bd. Freeholders Atlantic Co., Guarantee Trust Bldg., Atlantic City, reconstructing steel, concrete bridge over Patcong Creek, on Fire Rd. $25,000. A. H. Nelson, Atlantic City, co. engr.

N. J., Paramus—June 8, by State Hy. Comn., Trenton, bridge to carry Route 2, Sect. 6 over Route 4, Bergen Co. A. L. Grover, ch. clk.

N. Y., Brooklyn—June 11, by A. Goldman, comr. Plant & Structures, Municipal Bldg., New York, Metropolitan Ave. Bridge over English Kills, Brooklyn Boro. Former bids rejected. Noted May 14.

N. Y., Shelter Island and Brook Haven — Suffolk Co., Riverhead, bids about June 15,

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substructure bridges connecting Shelter Island with mainland, on north and south sides of island; and bridge, approaches from mainland to Ocean Beach at Smith's Point, Brook Haven, $3.350,000. Bids on superstructure later. Robinson & Steinman, 117 Liberty St., New York, engrs. Noted May 21.

Ohio—June 9, by O. W. Merrell, dir. hys., Columbus, two 45 ft. span concrete beam bridge over Mill Creek, Toledo-Angola Rd., Williams Co., $11,655—three 60 ft. span concrete bridge over Chagrin River, Wickliffe-Madison Rd., Lake Co., $36,952—57 ft. span steel beam bridge Baltimore-Reynoldsburg Rd., Fairfield Co., $19,874—968 ft. grade separation-project to have seven 45 ft. span and one 60 ft. spans, sidewalks, approaches, over Pennsylvania R.R., Ohio River Rd., in Toronto, Jefferson Co., $127,614.

O., Canton—June 17, by Comrs. Stark Co., concrete, steel, reinforced bridge over Little Beech Creek, Alliance Marlboro Rd., $25,000; concrete bridge on Mahoning Rd. N. E., $44,904. A. M. Wise, Canton, engr.

O., Cleveland — June 26, by Bd. Comrs. Cuyahoga Co., rein.-con. bridge over Columbus Rd. in connection with Lorain-Central Bridge, $284,658. Former bids rejected. Wilbur Watson & Associates, 4641 Prospect Ave., engrs. Noted May 7.

Pennsylvania—See "Streets and Roads."

Pennsylvania—June 5, by Bd. Comrs. Centre Co. (Bellefonte), 2 pony truss skew bridges over Elk Creek between Millheim and Coburn. $35,000.

Pa., Pittsburgh—June 9, by R. G. Woodside, controller Allegheny Co., Court House, Bridge 8 over Thompson Run, at Turtle Creek, incl. 1,875 cu.yd. excav., 975 cu.yd. concrete, 7,000 lb. reinforcing steel, 90,000 lb. steel sheet piling left in place $21,000—reinforcing south abutments of Bridge 20, over Chartiers Creek, incl. 6,000 lb. reinforcing steel, 22,000 lb. steel sheet piling, left in place $2,000—granite protection for McKees Rocks Bridge 2 over Ohio River, $15,800—steel borings for Bridge 9, Saw Mill Run, Elwin Station, $800. V. C. Covell, County Bldg., engr.

South Carolina—June 9, by State Hy. Dpt., Columbia, **(F.R.P. means Flood Relief Project)**, sub-structure and concrete approach span for 1,035 ft. rein.-con., structural steel bridge over Broad River, F.R.P. 15, Contr. 1, Cherokee Co. —structural steel superstructure for same bridge, Contr. 2—456 ft. rein.-con. bridge over Long Cane Creek, F.R.P. 17, McCormick Co.—60 ft. creosoted timber extension to existing creosoted timber bridge, State Project 526, Dillon Co.—300 ft. rein.-con. bridge over Gibson Creek, F.R.P. 16-A, Greenwood Co.—rein.-con. sub-structure, concrete approach for 998 ft. rein.con. and structural steel bridge over Saluda River, F.R.P. 16-B, Contr. 1, Greenwood and Newberry Counties—structural steel superstructure for same bridge, Contr. 2—525 ft. rein.-con. bridge over Little River, F.R.P. 16-C, Newberry Co.—250 ft. rein.-con. bridge over Juniper Creek, F.R.P. 29, Chesterfield Co.—100 ft. rein.-con. bridge over Holston Creek, 125 ft. rein.-con. bridge over Motlow Creek, and 350 ft. rein.-con. bridge over South Pacolet River, Federal Aid Project 305, Spartanburg Co. —350 ft. I-beam bridge over Ashepoo River, State Project 638, reopened, Colleton Co. — 1,290 ft. I-beam approach to bridge over Savannah River between Augusta and North Augusta, F.R.P. 13, Aiken Co.—additional work on existing bridge over Broad River, F.R.P. 11, Newberry and Fairfield Counties.

Vermont—June 5, by State Hy. Dpt., Montpelier, 3 span 99 ft. concrete bridge, gravel approaches over Williams River, Chester Depot.

CONTRACTS AWARDED

California—State Hy. Comn., Sacramento, 32½ ft. rein.-con. girder span bridge on concrete abutments with wing walls over Browns Creek, Trinity Co., to H. H. Boomer, Mills Bldg., San Francisco, $19,809. Noted Apr. 9.

Calif., Helena—C. H. Purcell, engr. State Hy. Comn., Sacramento, bridge to have 150 ft. through steel truss and two 47 ft. concrete girder spans on concrete piers, abutments, clearing roadway with 24 ft., Trinity Co., near here, to F. H. Nielson, Orland, $39,089. Noted Apr. 22.

Calif., San Francisco—S. J. Hester, secy. Bd. P. Wks., City Hall, bascule bridge over channel at 3rd St., to Barrett & Hilp, 218 Harrison St., for State Harbor Comn., City and San Francisco Co. $644,280. Noted Mar. 26.

Connecticut—State, Hy. Dpt. J. A. Macdonald, state hy. comr., Hartford, steel, concrete bridge, to M. A. Gammino Constr. Co., 728 Valley St., Providence, R. I., $24,823. Est. $25,000. Noted Feb. 26 under "Streets and Roads."

Florida—State Road Dpt., Tallahassee, B. M. Duncan, state hy. engr., three 34 ft. rein.-con. deck girder span bridge, concrete piers, abutments over Dania Canal, Federal Aid Project 78-B Rd• 4, Broward Co., to Dudley-Murphy Constr. Co., West Palm Beach, $24,105; constructing earth approach fills, laying Florida limerock base and surface treating Dunn's Creek Bridge Approaches, Project 952, Rd. 3, Putnam Co., to John S. Ballinger Constr. Co., Lakeland, $13,228. Noted May 4 Daily.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, 2 rein.-con. girder bridges, 3 rein.-con. culverts, Route 147, Sect. 113-B, Williamson Co., to M. & R. Constr. Co., Rockport, Ind., $29,085—two 160 ft. span steel superstructure, Route 151, Sect. 115-C, Jackson Co., to Interstate Steel & Iron Co., 1321 Edgar St., Evansville, Ind., $22,421 — rein.-con. girder bridge, substructure, Route 151, Sect. 115-B, Jackson Co., to R. H. King, Danville, $25,970. Grand total $77,476. Noted Apr. 9.

Iowa—State Hy. Comn., Ames, 3 bridges, in Allamakee Co., to A. Olson Constr. Co., Waterloo $9,860—2 I-beam spans Benton Co., to Duvall & McKinney, Logan $13,118—5 culverts in Clay Co., to H. Noel, Peterson, $1,150—repairing overhead structure in Linn Co., to H. O. Graham, Cedar Rapids $2,437. Grand total $26,565. Noted May 17.

Kansas — State Hy. Comn., Court House, Stockton **(P. means Project, F.A.P. Federal Aid Project)** to Schlicter Bridge Co., Clay Center, Bridge 1, P. 40N-11, F. A. P. 279-B Graham Co. $7,254; Bridge 4, same road $11,040, Bridge 2, P. 40N-12, F. A. P. 379-C Rooks Co. $7,487; Bridge 5 same road $11,378—to McKee & Hopper, Garden City, Bridge 2, P. 40N-11, F. A. P. 379-B Graham Co., $4,812; Bridge 3, same road $2,706; Bridge 1, P. 40N-12, F. A. P. 379-C Rooks Co. $1,965 — to V. E. Almgren, Bridge 6, P. 40N-12, F. A. P. 379-C Rooks Co. $10,485 — to J. W. Corrothers, Bridge 1, P. 15-16, F. A. P. 370-B Dickinson Co. $1,508; Bridge 2 same road $8,018—to Carson & Reid, Junction City, Bridge 1, P. 40S-19, F. A. P. 108-A Dickinson Co. $2,631; Bridge 1, P. 40S-20, F. A. P. 10-AB Geary Co. $6,476—to E. King, Kesston, Bridge 1, P. 40S-16, F. A. P. 474-B Saline Co. $3,377. Grand total $79,137. Noted Mar. 5, under "Streets and Roads."

New Jersey — State Hy. Comn., Trenton, bridge, Folsom Boro, Atlantic Co., to Hill Constr. Co., Mount Holly, $18,078. Noted May 7.

N. J., Elizabeth—Bd. Freeholders Union Co., Court House, bascule type lift bridge over Elizabeth River, at Summer St., to Snyder Eng. Co., 315 Richmond St., $131,900. Est. $150,000. Noted Apr. 28.

Ohio—O. W. Merrell, dir. hys., Columbus, steel truss bridge; 24 ft. roadway, approaches, Ashtabula Co., to W. A. Yeagle, Clyde, $16,999—three 140 ft. span steel truss bridge, 24 ft. roadway, approach slabs, Coshocton Co., to Purdy Constr. Co., Mansfield, $98,583—50 ft. span concrete beam bridge, 40 ft. roadway with two 5 ft. sidewalks and 23½ ft. span, concrete slab bridge, 40 ft. roadway, Franklin Co., to A. W. Burns Constr. Co., 424 Woodland Ave., Columbus, $21,553—three 65½ ft. and two 54 ft. span, steel beam bridge, 30 ft. roadway, two 5 ft. sidewalks, Monroe Co., to Clemmer-Noah Constr. Co., 129 West Bowery St., Akron, $63,158. Grand total $200,293. Noted May 14.

Wash., Machias—Comrs. Snohomish Co., Everett, steel bridge across Pilchuck Bridge, to Amer. Pile Driving Co., Everett, $29,610. Est. $35,000. Noted May 7.

West Virginia—State Roads Comn., Charleston, Bridge 822 over Fudges River, Cabell Co., to Duncan, Duncan & Morris, Huntington, $16,819—superstructure Stoney Bridge 1263, Grant Co., to Fairmont Mining Mchy. Co., Fairmont, $9,000—substructure for same bridge, to Pocahontas Constr. Co., Cass, $10,088—Polk Creek Bridge 1179, Lewis Co., to Davis & Reynolds, Morgantown, $6,624. Grand total $42,531. Noted May 14 under "Streets and Roads."

STREETS AND ROADS

BIDS ASKED

Arkansas—See "Contracts Awarded."

California—June 10, by C. H. Purcell, engr. State Hy. Comn., Sacramento, grading, concrete surfacing 8.6 mi. road between Williams and Maxwell, Colusa Co.—heavy fuel oil treating 37.8 mi. road from Pacheco Pass and easterly boundary line, 3 ft. on each side existing pavement, incl. 4,760 bbl. heavy fuel oil, Merced Co.—heavy fuel oil and cut-back asphalt as dust palliative surfacing 28.4 mi. road between Leevining and point 2 mi. west of Bridgeport, Mono Co.

Calif., Montebello—June 15, by J. P. Walker, clk., Los Angeles Co. (Los Angeles) curbing, guttering sidewalks, vitr. sewers, 1½ in. asphaltic concrete on 3½ in. asphaltic concrete base with disintegrated granite sub-base, 75,000 sq.ft. 6th St.

Calif., San Rafael—June 9, by R. E. Graham, clk. Marin Co., grading, drainage structures, bridges 4.3 mi. Millerton-Marshall Rd., incl. 23,000 lb. reinforcing steel screenings emulsified asphalt surfacing treating 4.3 mi. Nicasio Rd. Owner furnishes corrugated metal pipe.

Calif., Ventura—June 16, by L. E. Hallowell, clk. Ventura Co., improving Telegraph Rd., incl. 70 cu.yd. Class A concrete, 5,000 lb. reinforcing steel, 5,200 tons asphaltic concrete pavement, 12, 750 sq.ft. 2 in. bituminous macadam surfacing, $40,000.

Illinois—June 5, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete surfacing 1.3 mi. Route 6, Sect. PW-3, Cook Co. F. T. Sheets, ch. hy. engr.

Illinois—June 16, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, grading, concrete, bituminous filled brick on concrete or bituminous concrete on concrete surfacing 0.12 mi. Route 11, Sect. 36X, Dist. 8, Bond Co.—0.27 mi. Route 18, Sect. 11V-X, DuPage Co.—3.14 mi. Route 19, Sect. 70X-2—2.55 mi. Route 52, Sect. 522—6.5 mi. Route 52, Sect. 524—1.69 mi. Route 53, Sect. 539X—0.92 mi. Route 54, Sect. 541X—2.1 mi. Route 58, Sect. 583Y—5.59 mi. Route 58, Sect. 584Y—2.71 mi. Route 58, Sect. 585—3.09 mi. Route 60, Sect. 120Y, all Dist. 1, Cook Co.—13.92 mi. Route 47, Sect. 106X, Dist. 1, Kane Co.—10.33 mi. Route 53, Sect. 531, Dist. 1, Cook and Lake Counties—10.84 mi. Route 71, Sect. 115, Lee and De Kalb Counties—4.8 mi. Route 83, Sect. 133, Dist. 4, Knox and Stark Counties—2.82 mi. Route 99, Sect. 104, Dist. 4, Hancock and McDonough Counties—5.97 mi. Route 99, Sect. 105, Dist. 4, McDonough Co.—3.75 mi. Route 104, Sect. 141, Dist. 6, Sangamon Co.—4.96

Streets and Roads (Continued)

mi. Route 130A, Sect. 101, Dist. 7, Jasper Co.—5.87 mi. Route 146, Sect. 111, Dist. 9, Johnson and Pope Counties—1.8 mi. Route 146, Sect. 112X, Dist. 9, Pope Co.—7.05 mi. Route 173, Sect. 135, Dist. 1, Lake Co.—12.46 mi. Route 130, Sect. 120, Dist. 7, Cumberland and Jasper Counties—2.68 mi. Route 139, Sect. 101, Dist. 7, White Co., alternate bids on above roads 9 or 18 ft. wide — grading, drainage structures 10.5 mi. Route 100, Sect. 123-A, Dist. 8, Calhoun and Pike Counties—3.31 mi. Route 124, Sect. 101-A—5.19 mi. Route 124, Sect. 102-A, both Sangamon Co.—6.09 mi. Route 146, Sect. 104-A, Dist. 9, Union Co.—5.33 mi. Route 147, Sect. 115-A, Dist. 9, Johnson Co.—6.76 mi. Route 147, Sect. 116-A, Dist. 9, Johnson and Pulaski Counties—6.85 mi. Route 158, Sect. 122-A, Dist. 9, Randolph and Jackson Counties—3.71 mi. Route 89, Sect. 105-A, Dist. 3, Marshall and Putnam Counties. F. T. Sheets, hy. engr.

Ill., Aledo—June 8, by Bd. Comrs. Mercer Co., concrete surfacing 4.189 mi. Sect. 2-15d.

Ill., Belleville—June 6, by Bd. Comrs. St. Clair Co., grading 1.2906 mi. Sect. 81A-15d, 32 ft.; concrete surfacing 3.5549 mi. Sect. 83-15d, 20 ft. G. H. Baker, c/o State Hy. Dpt., Springfield, engr. county roads.

Ill., Bloomington—June 8, by Bd. Comrs. McLean Co., gravel surfacing 5.8457 mi. Sect. O-M.F.T., 16 ft.

Ill., Dixon—June 9, by Bd. Comrs. Lee Co., concrete surfacing 2.8 mi. Sect. 1-M.F.T., 18 ft. G. H. Baker, c/o State Hy. Dpt., Springfield, engr. county roads.

Ill., Galena — City Council soon takes bids paving Main and Spring Sts. $30,000 (State to pay half cost)—concrete paving Hill St. $13,000—12, 18 and 24 in. vitr. tile sewers in Boutillier St. $4,000. Marr, Green & Opper, 400 North Michigan Ave., Chicago, engrs.

Ill., Peoria—June 5, by Bd. Comrs. Peoria Co., concrete surfacing 3.55 mi. Sect. Z-4-15d and 4.3703 mi. Sect. Z-E-15d, 18 ft. R. H. Baker, c/o State Hy. Dpt., Springfield, engr. county roads.

Ill., Taylorville—June 5, by Bd. Comrs. Christian Co., concrete surfacing 3.2804 mi. Sect. 2-M.F.T., 18 ft.—5 rein.-con. box culverts, Sect. 2B-M.F.T.—19 corrugated metal pipe culverts, Sect 2B-1-M.F.T.

Ill., Virginia—June 9, by Bd. Comrs. Cass Co., grading 1.8655 mi. Sect. 1A-M.F.T.; 5.9712 mi. Sect. 2A-M.F.T. G. H. Baker, c/o State Hy. Dpt., Springfield, engr. county roads.

Ind., Evansville—June 11, by Bd. Comrs. Vanderburgh Co., asphaltic concrete surfacing Northwest Riverside Dr., $91,770 — Richardt Avenue Rd. $24,806 — Wedeking Avenue Rd. $17,180. E. D. Koenemann, Evansville, co. aud.

Ind., Indianapolis—June 10, by J. W. Cravens, secy. Indiana University Bd. Trustees, at office Jeup & Moore, Inc., 930 K. of P. Bldg., curbing, guttering, sewers, sidewalks, asphalt on concrete paving 7,000 sq.yd. at Indiana University Medical Center.

Iowa—June 9, by State Hy. Comn., Ames, grading, drainage structures, paving 30,610 sq.yd. U. S. Rd. 71 from Spencer north, F.218—132,820 sq.yd. U. S. Rd. 18 east of Spencer, P.259—6,936 sq.yd. U. S. Rd. 71 from Spencer south, P-256, all Clay Co.—12,115 sq.yd. U. S. Rd. 30, east of Wheatland, F-147—19,224 sq.yd. U. S. Rd. 30, from Clinton southwest, P-748, both Clinton Co.—87,900 sq.yd. U. S. Rd. 32, east of Waukee, P.623 Dallas Co.—21,428 sq.yd. U. S. Rd. 61 north of Maquoketa, P-448 Jackson Co.—6,506 sq.yd. U. S. Rd. 30, east of Cedar Rapids, F-22 Linn Co.—139,250 sq.yd. Primary Rd. 2, from Winterset, P-764 Madison Co.—12,904 sq.yd. Primary Rd. 74 from Davenport Scott Co.—grading, drainage structures 0.35 mi. U. S. Rd. 218, east of Van Horn, Benton Co.—0.622 mi. Primary Rd. 13, from Delaware Co. line, P-358—7.282 mi. Primary Rd. 99, from Hauntown north, P.696, both Clinton and Jackson Counties—0.606 mi. Primary Rd. 113, southeast of Hopkinton, F.249 Delaware Co.—0.624 mi. Primary Rd. 73, southeast of Belle Plaine, P-746 Iowa and Benton Counties—0.236 mi. Primary Rd. 128, south of Norwalk Warren Co.—11.494 mi. Rd. 99, P.697—11.926 mi. Primary Rd. 99, from Bellevue north P.699, both Jackson Co.—5.009 mi. Primary Rd. east of Bussey, P.753 Marion Co.—0.608 mi. Primary Rd. 112, P.236 Delaware Co.—gravel surfacing 3.58 mi. U. S. Rd. 55, from Dubuque, P-616 Dubuque Co. C. R. Jones, aud.

Ia., Allison—June 9, at office Auditor Butler Co., gravel surfacing 5 mi. trunk road from Dumont South. R. B. Girton, Allison, co. engr.

Ia., Cedar Rapids—June 8, at office Auditor Linn Co., grading Trunk Road V, incl. 40,000 cu.yd. excav., 45,000 sta. yd. overhaul; grading local and trunk roads, 9,000 cu.yd. excav., 4,500 sta. yd. overhaul, 57,502 cu.yd. castings. W. H. Behrens, Cedar Rapids, co. engr.

Ia., Pocahontas—June 8, at office Auditor Pocahontas Co., gravel surfacing 82 mi. secondary road. A. L. Thornton, Pocahontas, co. engr.

Kansas—June 9, by State Hy. Comn., Court House, Fredonia, **(P. means Project, F.A.P. Federal Air Project and K.P. Kansas Project)** bituminous blotter treating 1.037 mi. P. 6-6, F.A.P. 328-C—8.273 mi. P. 6-4, F.A.P. 424-A—0.614 mi. P. 73W-11, F.A.P. 21-C, all Allen Co.—1.044 mi. P. 6-7, F.A.P. 328-E—5.013 mi. P.38-1, F.A.P. 339-D—2.033 mi. P. 6-7, F.A.P. 328-D, all Anderson Co.—2.794 mi. P. 38-2, F.A.P. 339-E Linn Co.—2.295 mi. P. 73W-7, F.A.P. 380-B—0.521 mi. P. 73W-10, F.A.P. 334-C, both Neosho Co.—10.207 mi. P. 75-13, F.A.P. 402-C Woodson Co.—7.87 mi. P. 11-12, F.A.P. 322-F—2.647 mi. P. 11-10, F.A.P. 297-C, both Greenwood Co.—10 mi. P. 73W-5, K.P. 7422—7.7 mi. P. 166-13, K.P. 7425, both Labette Co.—4 mi. P. 96-29, K.P. 7423—1 mi. P. 47, K.P. 7424, both Wilson Co.—3.5 mi. P. 166-12, K. P. 7426 Montgomery Co.—11.25 mi. P. 75-16, K.P. 7348 Coffey Co.—7.5 mi. P. 75-10, K.P. 7385—7 mi. P. 75-7, K.P. 7386—8 mi. P. 75-8, K.P. 7387—2 mi. P. 75-9, K.P. 7388, all Wilson Co.—grading, culverts, concrete surfacing 0.023 mi. P. 16-1, F.A.P. 37-A Montgomery Co.—bituminous retread surfacing 10. mi. P. 54-41, F.A.P. 7467—bituminous drag treating 4.5 mi. P. 54-41, K.P. 7468 both Bourbon Co.—chat surfacing 3 mi. P. 54-32, K.P. 7445—8.7 mi. P. 54-30, K.P. 7446, both Greenwood Co.—4.1 mi. P. 160-43, K.P. 7447 Crawford Co.—4 mi. P. 96-29, K.P. 7448—7.5 mi. P. 47-2, K.P. 7452, both Wilson Co.—6 mi. P. 54-35, K.P. 7449—9.75 mi. P. 54-33, K.P. 7450, both Woodson Co.—4.5 mi. P. 6-4, K.P. 7451 Allen Co.—3 mi. P. 11-10, K.P. 7454, Greenwood Co.—10.3 mi. P. 166-5, K.P. 7455—5.5 mi. P. 166-8, K.P. 7459, both Chautauqua Co.—3 mi. P. 47-3, K.P. 7453 Neosho Co.—5 mi. P. 48-1, K.P. 7456—9 mi. P. 7-14, K.P. 7457, both Linn So.—12.2 mi. P. 7-18 and 19, K.P. 7460 Miami Co.—3 mi. P. D33-1, K.P. 7461—12 mi. P. 50S-40, K.P. 7463, both Franklin Co.—7 mi. P. 31-9, K.P. 7462—5 mi. P. 50S-36, K.P. 7464—13 mi. P. 50S-35, K.P. 7465—3 mi. P. 50S-37, K.P. 7466, all Coffey Co. W. V. Buck, Topeka, hy. engr.

Kentucky—June 10, by State Hy. Dpt., Frankfort, 6,968 ft. concrete curb and gutter, 205 ft. valley gutter through Sharpsburg, Fields Hy., Bath Co.—surfacing 0.9 mi. Fields Hy. through Flemingsburg, Fleming Co.—grading, drainage structures 4.308 mi. Edmonton-Tompkinsville Rd., Metcalfe Co.—900 ft. steel span, four 34 ft. rein.-con. deck girder span bridge on concrete piers, abutments over Scrub Grass Creek on Carlisle-Flemingsburg Rd. near Myers Station, Nicholas Co. B. Johnson, chn.

Maryland—June 9, by State Roads Dpt., Baltimore, G. C. Uhl, chn., concrete paving 6.65 mi. Cont. A-87-64, Allegheny Co.—0.83 mi. Contr. B-174-43, Baltimore Co.—1.06 mi. Contr. S-52-12, Somerset Co.—gravel surfacing 2.4 mi. Contr. C-27-82, Calvert Co.—crusher run slag oil treated surfacing 1.2 mi. Contr. Wi-78-17, Wicomico Co.; adv. E. N.-R. June 4.

Miss., Yazoo City—June 9, by D. M. Love, mayor and City Council, removing 61 trees, grading, curbing, guttering, sewers, drains, reconstructing 856 sq.yd. brick sidewalks, rein.-con., asphaltic concrete, cold lay sheet, sand rock asphalt, Topeka, Warrenite, sheet asphalt, lime rock asphalt, emulsified asphalt, Margerum surface course, or brick paving 142,357 sq.yd. streets, driveways and alleys. McGowen & Williams, consult. engrs.

Michigan—June 9, by H. W. Hagaman, div. engr., 504 Eddy Bldg., Saginaw, grading, shaping, drainage structures, concrete paving 3.387 mi. FO25-22 C-1, Genesee and Shiawassee Counties, for State Hy. Comn., Lansing.

Michigan—June 9, by H. W. Hagaman, div. engr., 504 Eddy Bldg., Saginaw, grading, shaping, drainage structures, concrete paving 4.327 mi. FO56-15-C-3, and 5.688 mi. FO56-15C-2, 20 ft., Midland Co., for State Hy. Comn., Lansing.

Michigan—June 10, by H. W. Hagaman, div. engr., Port Huron, grading, drainage structures 12.184 mi. FO44-24C-1, Lapeer Co., for State Hy. Comn., Lansing.

Michigan—June 11, by A. L. Burridge, div. engr., Cadillac, grading, shaping, drainage structures, concrete surfacing 1.136 mi. FO35-12C-2, Iosco Co., for State Hy. Comn., Lansing.

Miss., Yazoo City — June 9, various types paving on 5 or 6 in. concrete 35,331 sq.yd. also grading, drainage structures, rein.-con. surfacing 34,000 sq.yd. McGowen & Williams, Yazoo City, engrs.

Mo., Clayton—June 10, by St. Louis Co., Court House, concrete slab paving 12,414 ft. Big Bend Rd.—3,267 ft. Airport Rd., from Lambert St. Louis Flying Field to Kinlock Park—5,795 ft. same road from east line Ferguson Ave. to western limits—1,892 mi. Pennsylvania Ave. R. Jablonsky, Court House, co. engr.

Mo., St. Louis—City, Bd. P. Serv., City Hall, soon takes bids walks, driveways, subway, electric fountain, pool, parking lots, rest house in Aloe Plaza. $200,000. Private plans.

Mont., Glendive—Bids about July 1, curbing, rein.-con. and sheet asphalt on 5 in. concrete paving 10,500 sq.yd. $25,000. Former bids postponed. C. Eyre, city engr.

Neb., Seward—June 9, by U. H. Franklin, clk. Seward Co., Court House, graveling 63,360 sq.yd. Project 11—89,760 sq.yd. Project 12—73,920 sq.yd. Project 13—10,560 sq.yd. Project 14—7,920 sq.yd. Project 15—2,640 sq.yd. Project 16—58,080 sq.yd. Project 17—36,960 sq.yd. Project 18.

Nevada—June 10, by Directors Dpt. Hys., Carson City, crushed rock or crushed gravel surfacing mixed with asphaltic fuel oil on portion state hy. from Las Vegas to point 10 mi. southeast, Route 5, Sect. D-1, Clark Co.

New Hampshire—June 11, by State Hy. Dpt., Concord, grading, 6 in. one course rein.-con. on 8 in. gravel base course surfacing 26,760 sq.yd. South Side Rd., Peterboro, $111,000; 32,990 sq.yd. Daniel Webster Hy., Franklin, $120,000.

N. J., East Orange—June 8, by City Council, City Hall, 2 in. national, 2 in. warrenite, or 3 in. sheet asphalt on 6 in. concrete paving 1,240 sq.yd. Watson Ave. $25,000. E. Willergerod, city engr.

N. J., East Orange—June 8, by City Council, City Hall, granite curbing, grading, 2 in. Warrenite bitulithic or 3 in. sheet asphalt on 6 in. concrete paving 7,700 sq.yd. North Clinton St. $25,000 or more. E. Willegerod, city engr.

N. J., Imlaystown—June 6, by Twp. Com., slag or trap rock paving 8,100 sq.yd. Allentown-Crosswicks Rd., 20 ft. A. D. Bullock, 218 West State St., Trenton, engr.

New York—June 22, by Westchester Co. Park Comn., Bronxville, grading, one course concrete paving 20,000 cu.yd. Bronx Parkway extension from Highland Ave. to Crompond Rd., Peekskill and Cortlandt. J. Downer, ch. engr.; adv. E.N.-R. June 4.

New York—June 23, by A. W. Brandt, comr. Hys., Albany, constructing hys. in Genesee, Jefferson, Livingston, Orange, Ulster, Steuben and Westchester Counties; reconstructing hys. in Chenango, Erie, Onondaga, St. Lawrence and Washington Counties; adv. E.N.-R. June 4.

N. Y., Buffalo—June 11, by W. Rathman, comr. P. Wks., paving Courtland St., Harriet, Hazelwood, and Wilkes Aves., repaving railway area in Exchange St., also Exchange, and Georgia Sts.

N. Y., Johnstown—June 15, by A. Wands, city clk., rein.-con. paving 3,480 ft. Chestnut and West Madison Sts.

Ohio—June 9, by O. W. Merrell, dir. hys., Columbus, paving with **(a)** brick, incl. furnishing, delivering brick **(b)** concrete **(c)** bituminous macadam **(d)** brick **(e)** sheet asphalt, **(f)** gravel **(g)** sheet asphalt paving **(h)** Kentucky rock asphalt 1.076 mi. Sect. "G" Newark-Coshocton Rd., Licking Co. **(a)** $57,573 **(b)** $43,630 **(c)** $51,446—4.1 mi. Sect. "F" Newark-Coshocton Rd., Muskingum Co. **(a)** $160,275 **(b)** $105,762 **(c)** $138,428—0.128 mi. Sect. "Feazersburg" Newark-Coshocton Rd., Muskingum Co., **(a)** $4,720 **(b)** $3,012 **(c)** $4,035—Bellefontaine-Wapakoneta Rd., Auglaize Co. **(c)** $15,321—Cincinnati-Brookville Rd., Carroll Co. **(a)** $215,338 **(b)** $158,863—0.751 mi. Salon-Willoughby Rd., Cuyahoga Co. **(d)** $76,204—Richmond Rd., Cuyahoga Co. **(d)** $46,728 **(e)** $43,312—1.632 mi. Cadiz-Carrollton Rd., Harrison Co. **(b)** $37,078 **(c)** $42,008—1.884 mi. Wickliffe-Madison Rd., Lake Co. **(b)** $119,075—2.115 mi. Cleveland-Sandusky Rd., Lorain Co. **(b)** $76,367 **(d)** $118,082—10.5 mi. Columbus-Sandusky Rd., Marion Co. **(f)** $43,420—5.026 mi. Dayton-Troy Rd., Miami Co. **(b)** $129,327—Mansfield-Wooster Rd., Richland Co. **(g)** $13,525—2.325 mi. Chillicothe-Lancaster Rd., Ross Co. **(b)** $55,538 **(d)** $85,175—2.636 mi. North Springfield-Stow Rd., Summit Co. **(d)** $88,807—4.829 mi. Warren-Meadville Rd., Trumbull Co. **(b)** $165,720 **(c)** $154,043—1.276 mi. Toledo-Angola Rd., Williams Co. **(b)** $44,285 **(c)** $46,217—0.537 mi. Findlay-Upper Sandusky Rd., Wyandot Co. **(c)** $14,600 **(h)** $17,800.

O., Cleveland—June 5, by City, paving East 86th St. from Connecticut to Grand Division Aves. and opposite safety zones at Chester Ave. and East 2nd St. and at Euclid Ave. and Ford Dr. To exceed $25,000. R. Hoffmann, City Hall, engr.

O., Cleveland—June 10, by City, paving East 106th St. from Union to Eliot Aves. and West 41st St. from Lorain to Bailey Aves. $25,000. R. Hoffmann, City Hall, engr.

O., Toledo—June 9, by O. H. Schoonmaker, city engr., City Hall, integral curbing and guttering, concrete paving 7,600 sq.yd. Powhattan St., $44,500—7,550 sq.yd. Gunckel St., $45,000—7,550 sq.yd. Sherbrooke St. from Kenwood to Central Sts. $45,400.

South Carolina—June 9, by State Hy. Dpt., Columbia, **(F.A.P. means Federal Aid Project and S.P. State Project)**, clearing, grubbing, concrete paving 12 mi. F.A.P. 28-A, reopened, and S.P. 728-B, reopened, and 728-C, Orangeburg and Calhoun Counties—18 mi. S.P. 795, Pickens Co.—9 mi. F.A.P. 110, reopened and S.P. 652 reopened, Newberry Co.—11 mi. F.A.P. 86, reopened and extension and 193 reopened, Sect. 2, Allendale Co.—20 mi. F.A.P. 115-A, B-C reopened, Orangeburg and Dorchester Counties—24 mi. S.P. 590-A and B reopened, Horry Co.—12.5 mi. F.A.P. 306 and extension—0.065 mi. S.P. 522-B, both Aiken Co.—clearing, grubbing, drainage structures, concrete paving 17.4 mi. F.A.P. 309 and 225 reopened, and S.P. 815-A, Chester Co.—7 mi. S.P. 804-B, Lancaster Co.—17 mi. F.A.P. 48, reopened and extension 1 and 2, Georgetown Co.—clearing, grubbing, grading, sand clay surfacing in preparation for hardsurfacing 10 mi. S.P. 763, Bamberg Co.—18 mi. S.P. 818-B, Marion Co.—17 mi. S.P. 776—18 mi. S.P. 814 and 818-A, both Florence Co.—11.5 mi. S.P. 783-A and B, and 556 reopened, Colleton and Hampton Counties—8.5 mi. S.P. 533, Lexington Co.—21.5 mi. S.P. 777-A and B, Aiken Co.—clearing, grubbing, grading, bituminous surfacing 15.5 mi. F.A.P. 293-B and C, Contr. 2, Greenwood Co.—11 mi. F.A.P. 298, reopened, Sect. 2, Laurens Co.—15.5 mi. S.P. 744-A and 656-C, reopened, McCormick Co.—34 mi. S.P. 742-A reopened, 742-B reopened, 762A and B, Contr. 2, and F.A.P. 80, reopened, Clarendon and Williamsburg Counties—15.7 mi. S.P. 532-A and B, reopened, and 638 reopened, Colleton Co.—19 mi. S.P. 760-A, B, C and D, Beaufort Co.—17 mi. S.P. 681-A and B, reopened, Spartanburg Co.—7.5 mi. S.P. 793, Contr. 2, Newberry Co.—28 mi. S.P. 714-A and B, Contr. 2, and 564, reopened, Chesterfield Co.—grading 22 mi. S.P. 824-A and B, Clarendon and Florence Counties—14 mi. S.P. 781, Florence Co.—clearing, grubbing, grading, topsoiling 8 mi. S.P. 684-A and B, Chester Co.—0.6 mi. S.P. 516, Saluda and Newberry Counties—8 mi. F.A.P. 147, reopened, Cherokee Co.—clearing, grubbing, grading in preparation for hardsurfacing 12.5 mi. F.A.P. 207-E and F, Union and Cherokee Counties—13 mi. F.A.P. 311-A and 137, reopened, Anderson Co.—11 mi. S.P. 784-A and B, Marlboro and Darlington Counties.

Tex., Corsicana—June 15, by Navarro Co., c/o J. M. Tullos, aud., grading, drainage structures 7.5 mi. road, 26 ft. $30,000. W. M. McClendon, Corsicana, engr.

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Streets and Roads (Continued)

Utah—June 10, by State Hy. Dpt., Salt Lake City, concrete paving 2.57 mi. state hy. through Lehi, Utah Co. H. S. Kerr, state hy. engr.

Vermont—June 5, by State Hy. Dpt., Montpelier, grading and base 4.3 mi. hy. Chester—gravel surfacing, grading sub-base 5.31 mi. Conventry—Newport City.

Wash., Seattle—Comrs. King Co., Seattle, bids about June 11; paving 2.75 mi. Issaquah-Newport Rd., west shore Lake Sammamish. T. D. Hunt, Seattle, engr.

Wash., Seattle—Comrs. King Co., bids about July 1, concrete paving 4.7 mi. Woodinville-Duvall Rd. $125,000. T. D. Hunt, Seattle, engr.

Wash., Seattle—Comrs. King Co., bids about July 15, grading, graveling 1.75 mi. Soos Creek-Berrydale Rd. $25,000. T. D. Hunt, Seattle, engr.

Wisconsin—State Hy. Comn. and Hy. Com. Portage Co., Wisconsin Rapids, withdrew bids to have been opened June 3, bituminous surfacing 3.18 mi. for Spirit Almond Rd., Portage Co. Noted May 28.

Wisconsin—June 9, by State Hy. Comn. and Hy. Com. Columbia Co., Madison, concrete paving 78,281 sq.yd. Portage-Endeavor Rd., U. S. Hy. 51, F.A.P. 307 and S.A.P. 1353, Columbia Co.

Wisconsin—June 10, by State Hy. Comn. and Hy. Coms. Eau Claire and Clark Counties, Eau Claire, concrete paving 110,788 sq.yd. Eau Claire-Fall Creek Rd., Hys. 10 and 12, F.A.P. 395-C, 88,228 sq.yd. Fairchild-Neillsville-Marshfield Rd. U. S. Hy. 10, F.A.P. 193, Clark Co.

Ont., New Liskeard—June 5, by W. P. Ackroyd, town clk., asphalt on concrete paving 16,800 sq.yd. Armstrong and Whitewood Sts. $50,000. Wynne-Roberts, Son & McLean, Metropolitan Bldg., Toronto, engrs.

Ont., Sarnia—June 13, by W. B. Beatty, engr., City Hall, asphalt on concrete paving Russell St. from Wellington to Green Sts. $69,190.

Ont., Simcoe—See "Contracts Awarded."

CONTRACTS AWARDED

Arizona—State Hy. Comn., Phoenix, grading, surfacing 7.8 mi. Ash Fork-Flagstaff Hy., F.A.P. 89D, to O. F. Fisher, 516 South 7th St., Phoenix, $103,554; 9 mi. same road, F.A.P. 89E, to Parkard, Tanner & Morse, 905 West Latham St., Phoenix, $111,682. Noted May 1.

Arkansas—State Hy. Dpt., Little Rock, single course asphalt coated stone surfacing 12 mi. Job 1135, White and Woodruff Counties, to C. S. Constant & Co., Little Rock $60,313—concrete surfacing 8 mi. Job 6122, Prairie Co., to D. F. Jones Constr. Co., Little Rock, $160,075—grading, drainage structures 8 mi. Job 10129, Randolph Co., to H. A. Worman, Pittsfield, Ill. $37,846. Est. $258,234. Rejected bids May 21, grading, surfacing Job 1137, Pulaski and Perry Counties, $210,000—Job 1136, Prairie and Monroe Counties, $110,000—Job 7164, Calhoun and Dallas Counties, $220,000—Job 7163, Ouachita Co., $160,000—Job 5122, White Co., $90,000—Job 3180, Lafayette Co., $150,000—Job 2181, Jefferson Co., $110,000. C. C. Christian, hy. engr.

California—G. H. Purcell, engr. State Hy. Comn., Sacramento, concrete surfacing 1.4 mi. road between Wise Power House and Auburn, 20 ft., Placer Co., to Frederickson & Watson Constr. Co., 354 Hobart St., Oakland, $147,585. Noted Apr. 23.

Calif., Lodi—J. F. Blakeley, city clk., grading, concrete paving Cherokee Lane, to R. H. Crummey, Cecil Hotel, San Francisco, $61,298.

Calif., Oakland—F. C. Merritt, city clk., grading, curbing, sidewalks 7- to 9-in. concrete paving 395,000 sq.ft. Hopkins St., between High St. and 55th Ave., to Heafey-Moore, Inc., 344 High St., $113,744. Noted Apr. 30.

Calif., Redlands—City Council, curbing, sidewalks, macadam paving 280,000 sq.ft. West Highland Ave., to E. L. Fleming, 5467 Phyllis Ave., Glendale, $30,650.

Calif., San Diego — City Council, grading, curbing, sidewalks, 6 in. concrete surfacing 13,885 sq.yd., 6 in. asphaltic concrete surfacing 29,455 sq.yd. Addison St., et al., to Daley Corp., 4430 Boundary St., $134,617. Noted Apr. 23.

Calif., San Francisco—S. J. Hester, secy. Bd. P. Wks., City Hall, curbing, guttering, sidewalks, asphaltic concrete paving 85,000 sq.yd. Sect. C Bayshore Blvd., to Pacific States Constr. Co., Call Bldg., $28,168. Noted May 14.

Calif., San Jose—Santa Clara Co., 4½ in. asphaltic concrete surfacing 260,000 sq.ft. Northrup and Moorpark Aves., to A. J. Raisch, Burrell Bldg., San Jose, $27,770.

Calif., Santa Ana—J. M. Backs, clk., Orange Co., improving Manchester Ave., incl. 223,700 sq.ft. gravel base, 4,550 cu.yd. concrete paving, corrugated metal pipe culverts, to Kovacevich & Price, 5400 Imperial Hy., South Gate, $32,668.

Colorado—State Hy. Dpt., Denver, c/o C. D. Vail, engr., concrete surfacing 4.502 mi. Hy. 1 north of Aguilar-Las Animas Co., to Orman Constr. Co., Pueblo, $192,444.

Florida — State Road Dpt., Tallahassee **(F.A.P. means Federal Aid Project)**, concrete paving 9.66 mi. Rd. 1, F. A. P. 77, Jackson and Washington Counties, to Van Gordon Constr. Co., Jacksonville, $219,014—2.67 mi. Rd. 17, F. A. P. 80, and 0.92 mi. Rd. 17, Project 710 D, both Hillsborough Co., to John J. Quinn Co., Inc. Miami, $96,053 and $37,236 respectively—

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tively — clearing, grubbing, grading, drainage structures, macadam asphalt paving 3.3 mi. Rd. 14, F. A. P. 81, Alachua Co., to L. M. Gray, Gainesville, $99,753—limerock base surface treating 9.2 mi. Rd. 5, F. A. P. 83, Sarasota Co., to E. P. Powers Constr. Co., West Palm Beach, $238,535. Grand total $669,591.

Idaho—A. Harbour, comr. P. Wks., Boise, grading, graveling 3.998 mi. Lost River Hy., Idaho F.A.P. to Idaho Contg Co., Boise., $44,383 est $49,454; 10.652 mi. Roosevelt Hy., Idaho F.A.P. 120-B and F.L.P. 2-a, to Robinson Constr. Co., Twin Falls, $114,934. Est. $120,386. Noted May 7.

Indiana — State Hy. Comn., Indianapolis, grading, drainage structures, concrete surfacing 11,669 sq.yd. Rd. 31, Howard Co., to W. J. Nees Co., Mishawaka, $38,398, est. $47,993; 71,831 sq.yd. Rd. 50, Martin Co., to Premier Constr. Co., Lemcke Bldg., Indianapolis, $105,199 est. $118,016. Noted Apr. 23 and 30.

Indiana — State Hy. Comn., Indianapolis, grading, drainage structures, concrete surfacing 117,429 sq.yd. Federal Aid Project 220-B, Rd. 18, Jay Co., to Cunningham Constr. Co., 301 West Washington St., Indianapolis, $181,379. Est. $222,637. Noted Nov. 13.

Ind., Indianapolis—Concrete paving, 46th St., from Monon Rn. to Keystone Ave., to Indianapolis Asphalt Paving Co., 2810 Columbia Ave., $29,105.

Ind., Princeton—Bd. Comrs. Gibson Co., concrete surfacing 3.5 mi. E. Bertram Rd., to W. H. Leffler, Francisco, $22,270 est. $31,703; rock and gravel surfacing 3 mi. H. S. Remerhausen Rd., to R. D. Manning, Decker, $14,945 est. $22,115. Noted Apr. 23.

Ind., Shelbyville—Shelby Co., concrete surfacing 9,600 ft. M. G. Talbert Rd., to Lawrence Jenkins, Frankfort, $32,652. Est. $40,685. Noted Apr. 30.

Ind., South Bend—St. Joseph Co., concrete surfacing 2.7 mi. Homer Short Rd., and 1.5 mi. Otto Baker Rd., to Williston Constr. Co., South Bend, $45,900 and $24,300 respectively, est. $77,800 and $43,000 respectively—0.5 mi. Spring St. Rd., to H. W. Reed, Mishawaka, $6,999 est. $10,700. Noted Apr. 16.

Iowa — State Hy. Comn., Ames, grading, drainage structures, paving 0.94 mi. roads in Winneshiek Co., to T. Fisko, Garber, $2,819—0.578 mi. Woodbury Co., to H. Noel, Peterson, $24,866—grading, drainage structures 0.557 mi. Fremont Co., to E. J. Wilson & Son, Omaha, Neb., $4,414—5.389 mi. Iowa Co., to W. C. Boyd, Cedar Rapids, $14,686—gravel surfacing 5.824 mi. Adams Co., to McDougall Constr. Co., Sioux City, $7,775—15.715 mi. Allamakee Co., to Interstate Constr. Co., Madison, Wis., $27,388 — 1.082 mi. Taylor Co., to McDougall Constr. Co., Sioux City, $1,431. Grand total $83,379. Noted May 17.

Ia., Algona—Kossuth Co., gravel surfacing secondary roads, to Paul & Donnelly, Ft. Dodge, $31,645. Noted May 7.

Ia., Iowa City—G. J. Doher, city clk., grading, curbing, catch basins, brick or rein.-con. paving 19,045 sq.yd., to W. Horrabin Contg. Co., Iowa City, $64,250. Est. $104,399.

Ia., Hampton — Bd. Comrs. Franklin Co., gravel surfacing secondary roads, to Ferguson-Diehl Constr. Co., Dana, $19,757; to G. E. Sargent Co., Hampton, $8,624; to J. Schumacher, Bancroft, $7,076. Grand total $35,457.

Ia., Sioux City—Concrete paving Fairmont St. from Westcott to Alice Sts., and Turner and West 6th Sts. from Collins to Leonard Sts., to Hansen & Wesley, 1616 West 5th St., $13,884 and $6,684 respectively; Leonard St. from West 1st to West Horne Sts., and alleys, to Harrington & Jorgensen, 3904 6th Ave., $4,790 and $3,099 respectively. Est. $28,457.

Kentucky—State Hy. Dpt., Frankfort, grading, drainage structures using double strength vitr. pipe 5.62 mi. Flemingsburg-Carlisle Rd., Fleming Co., to B. W. Gorham Co., Lexington, $35,870—grading, drainage structures, using 1st class rein.-con. pipe 16.471 mi. Cadiz-Tennessee State Line Rd., Trigg Co., to Corum Bros., Madisonville $97,183—rein.-con. paving 10.941 sq.yd. Wickliffe-Paducah Rd., Ballard Co., to N. E. Stone & Co., Madisonville, $144,222. Grand total $277,275. Noted Apr. 9.

Me., Portland—City, Purchasing Agent, City Hall, granite block paving Noyes and Devonshire Sts., to Monitor Constr. Co., 187 Middle St., $11,736.

Maryland—State Roads Comn., G. C. Uhlchn., Baltimore, concrete paving, with slag shoulders 1.5 mi. Contr. Q-67-22, Queen Anne Co., to Hannemann-Burroughs Co., Salisbury, $18,875—concrete paving 1.2 mi. Contr. D-80-12, Dorchester Co., to Aiello Contg. Co., Gough and Dean Sts., Baltimore, $21,766 — concrete roadway and timber bridge 0.74 mi. Contr. Wo-100-12, Worcester Co., to P. D. Phillips & Bro., Salisbury, $27,882. Grand total $68,523.

Md., Baltimore—Bd. Awards, concrete paving 6,900 sq.yd. streets listed in Contr. 596, to Aiello Contg. Co., Gough and Dean Sts., $13,091.

Md., Baltimore—Bd. Awards, concrete paving 9,300 sq.yd. streets listed in Contr. 597, to Aiello Contg. Co., Gough and Dean Sts., $17,148. Noted May 7.

Mass., Brookline—Town, Bd. Selectmen, sheet asphalt paving Newton St., to C. & R. Constr. Co., 75 Bradeen St., Roslindale, $51,581.

Michigan—A. L. Burridge, div. engr., Cadillac, sheet asphalt on gravel resurfacing and building up shoulders 11.713 mi. FO72-9C-2, Roscommon Co., to Detroit Asphalt Paving Co., 909 Transportation Bldg., Detroit, for State Hy. Comn., Lansing, $123,631. Noted Apr. 30.

Michigan—At office H. C. Fleming, resident engr., Grand Rapids, grading, shaping, drainage structures, concrete paving 3 mi., and shaping, 20 ft. concrete surfacing 6.264 mi. FO34-10, Contr. 4, Ionia Co., to C. F. Vinton, Coldwater, for State Hy. Comn., Lansing, $197,675, incl. cement. Noted Apr. 23.

Michigan—H. W. Hagaman, div. engr., 208 Kresge Bldg., Port Huron, grading, shaping, drainage structures, 20 ft. concrete surfacing 7.096 mi. FO32-37 Contr. 2, Huron Co., to James A. McKay & Son, 16549 Woodward St., Detroit, for State Hy. Comn., Lansing, $256,919 incl. cement. Noted Apr. 30.

Michigan—H. W. Hagaman, div. engr., 504 Eddy Bldg., Saginaw, grading, shaping, drainage structures, capping, widening existing pavement 9.085 mi. FO73-29C, and 1.373 mi. FO25-23C-1, Genesee and Saginaw Counties, for State Hy. Comn., Lansing, to J. A. Mercier, 450 West Fort St., Detroit, $442,182 and $84,073 respectively, both incl. cement. Noted May 7.

Michigan—W. J. Kingscott, div. engr., 213 Watson Bldg., Grand Rapids, grading, shaping, drainage structures, concrete paving 2.901 mi. FO41-32C-3 and FO70-26C-1, Kent and Ottowa Counties, to John R. Edelman Co., Muskegon Heights, for State Hy. Comn., Lansing, $140,424. Noted May 7.

Mich., Grand Rapids—Kent Co., grading, one course concrete paving 1 mi. Fuller Ave. extension from Leonard to Knapp Sts., 20 ft., to Gould & Cross, Grand Rapids, $27,445.

Mich., Ionia—Ionia Co. Road Comn., grading, shaping, Class A one course gravel surfacing 4.98 mi. roads, 16 ft., to C. F. Light, St. Johns, $26,392.

Minnesota—State Hy. Dpt., St. Paul, to Anderson & Son, Inc., 100 North 7th St., Minnesota, 9 mi. concrete paving S.P. 7-36, $145,446 21.3 mi. S.P. 14-24, Sect. 2, Div. B, S.P. 140-24, Sect. 1; and S.P. 14-23, $299,611; 17.2 mi. S.P. 14-26 Sects. 1 and 2, S.P. 14-25, Sect. 2, Div. A, $250,177; 12.9 mi. S.P. 15-34, Sect. 1, S.P. 16-25, Divs. A and B, $175,499—to S. J. Groves & Sons, 529 South 7th St., Minneapolis, grading, subgrading 21.3 mi. S.P. 14-24, Sect. 2, Div. B, and S.P. 14-24, Sect. 1 and S.P. 14-23, $100,437. Grand total $971,170. Noted May 7.

Minn., St. Paul—C. A. Carlson, city purch. agt., oil asphalt repaving Summit Ave. to Thornton Bros. Co., 1343 Dayton Ave., $89,987. Noted May 7.

Mississippi—State Hy. Comn., Jackson, concrete surfacing 4 mi. Brookhaven-Thayer Rd., Federal Aid Project 217-A, Lincoln Co., to Hartman-Clark Co., 920 Peoria Life Insurance Bldg., Peoria, Ill., $80,763.

Mississippi—State Hy. Dpt., Jackson, gravel surfacing 3.712 mi. Hys. 56 and 64 and 3.915 mi. Hys. 57 and 64, Polk Co., to M. E. Gillioz, Monett, Mo., $31,786 and $40,731 respectively.

Mo., Clayton—St. Loius Co., Court House, grading, rein.-con. paving each side St. Louis Public Service Co. tracks on Midland Ave., to Israel Bros. Constr. Co., 6635 Delmar Blvd., St. Louis, $95,668—1,165 ft. Natural Bridge Rd., to H. B. Dawson, 6734 Scanlon Ave., St. Louis, $26,436—bituminous paving 8,671 ft. Ennis Ave., to C. N. Lund, 114 North 7th St., St. Louis, $42,435—2,697 ft. Millburn Ave., to Eyermann Contg. Co., 1210 South Grand Blvd., St. Louis, $11,888. Grand total $176,427. Noted May 7.

Mo., St. Louis—Bd. P. Serv., City Hall, grading 14,900 cu.yd. Pernod Ave., to Webb-Boone Paving Co., 5103 Fyler Ave., $4,583—concrete paving 2,280 sq.yd. Fairview Ave., to Stiers Bros. Constr. Co., 2944 Magazine St., $11,932—1,800 sq.yd. Hampton Ave., to J. F. McMahon, Constr. Co., Buder Bldg., $9,131—asphalt on concrete paving 4,650 sq.yd. Loughborough Ave. to Asphalt Paving Co., 1328 Sublette Ave., $22,003—9,640 sq.yd. Dolman St., to Flinn Paving Co., 1405 South 1st St., $44,254—warrenite bitulithic on concrete paving 7,040 sq.yd. LaSalle St., to Granite Bituminous Paving Co., Railway Exch. Bldg., $33,388—grading, concrete paving alleys in City Blocks 4181 and 4419WA, to Kunze Constr. Co., 5926 Scanlon Ave., $2,477—in City Block 5349, to Chase Constr. Co., 5230 Devonshire Ave., $4,184—in City Block 5637, to Creech Constr. Co., 5619 Natural Bridge Ave., $4,129—in City Blocks 5646 and 5739, to Alfred Lewald, Inc., 5473 Delmar Blvd., $3,939—in City Blocks 5764 and 4733W, to Eyermann Constr. Co., 1210 South Grand Blvd., $4,729; sewers in Southwestern Sewer Dist. 6, to Hogan Constr. Co., 2915 Allen Ave., $11,787. Grand total $156,536. Noted Apr. 30.

Neb., Omaha—Douglas Co., paving 2.26 mi. Underwood and Ames Aves., to Busche & Gavenman Constr. Co., Omaha, $76,496.

New Hampshire—State Hy. Dpt., Concord, grading, rein.-con. paving 41,006 sq.yd. Daniel Webster Hy., Franklin and Tilton, to Arborio Road Constr. Co., 525 Main St., Hartford, Conn., $112,397. Est. $170,000. Noted May 14.

N. J., Hackensack — Bd. Freeholders Bergen Co., Court House, repairing concrete hys. in Ridgefield, Palisades Park and Fort Lee, to Maceri & Cutrupi, 2184 Hudson St., Fort Lee, $25,404. Est. $30,000.

N. J., Jersey City—Bd. City Comrs., City Hall, grading, asphalt paving Fox Pl., Chestnut Ave., and 7th St., to Municipal Constr. Corp., 26 Journal Sq., $26,000 and $98,000 respectively.

Streets and Roads (Continued)

N. J., Jersey City — Bd. City Comrs., City Hall, asphalt paving Newark Ave., to Lettiere-Bellezza Co., 921 Bergen Ave., $36,033.

N. J., Keyport—Boro Council, Boro Hall, Type C rein.-con. repaving approaches to Bridge 3, 1st St., Keyport and Bway., Union Beach, to Barney Paving Co., Keyport. Est. $25,000. Noted Apr. 24.

N. J., Little Ferry—Bd. Boro Council, Boro Hall, grading, rein.-con. paving Picken St., to Curtin Bros., Inc., Bergen Turnpike, Little Ferry, at $2.15 per sq.yd. Noted Apr. 30.

N. J., New Brunswick—Bd. City Comrs., City Hall, bituminous macadam paving Buccleench Park, to Utility Constr. Co., 5 Spring St., $42,828. Est. $50,000. Noted Apr. 30.

N. J., Paterson—Passaic Co. Park Comn., 45 Church St., bituminous macadam paving entrance road to Golf House at Preakness Valley Park, to W. A. Ferguson & Sons, Riverview Dr., Little Falls. Est. $25,000.

N. J., Paterson—Bd. P. Wks., City Hall, asphalt repaving Bway., to G. F. Brackett, Market St., East Paterson; River St., to R. S. Sowerbutt, 244 Highland Ave. Est. $25,000.

N. J., Paterson — Bd. P. Wks., City Hall, asphalt repairing East 22nd and 23rd Sts., Illinois, Knickerbocker, 9th, Maitland and Sherwood Aves., to R. S. Sowerbutt, 244 Highland Ave.; penetration macadam, to P. S. Kramer, 45 Church St., rounding curb corner, to L. Cramer, 70 19th Ave., Paterson. Est. $25,000.

N. J., Ridgewood — Bd. Village Comrs., 29 Hudson St., sanitary sewers in North Pleasant Ave. and South Hill St. $25,000. **Maturity soon.** R. A. Horton, 29 Hudson St., village engr.

N. J., Union City—Bd. City Comrs., City Hall, grading, rein.-con., paving 8th St., to Curtin Bros., Inc., Bergen Turnpike, Little Ferry, $37,-993. Noted May 21.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, to D. J. McCoy Asphalt Co., Avenue U and East 57th St., asphalt paving Bergen St. $43,959; 74th St. $6,379 — to B. Turecamo, New Cropsey Lane, Blake Ave. $24,652; East 28th St. $7,957; West 3rd St. $8,114 — to Carbloc Paving Co., Stagg St., Pennsylvania Ave. $40,758—to M. O'Hara, Neptune Ave. and West 19th St., West 23rd St. $9,093—to W. J. McHale, 1250 Jefferson Ave., East 45th St., $2,019; East 93rd St. $2,700; Linwood St. $3,565. Grand total $115,196. Noted Apr. 30.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., asphalt paving Tibbett Ave., to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., $18,582—asphalt block paving East 146th St., to Regan Towers Co., 124 West 121st St., $15,789 — granite block paving East 136th St., to Columbia Eng. & Contg. Co., $34,977—Locust Ave., to Meehan Paving Co., 90 West St., $23,-271—grading Cruger Ave., to A. Spadaro, 724 East 225th St., $10,373 — Mace Ave., to P. Mascali, 454 Tremont Ave., $8,886. Grand total $111,878. Noted May 14.

N. Y., New York—S. Levy, pres. Manhattan Boro, Municipal Bldg., asphalt repaving Bway., to Meehan Paving & Constr. Co., 90 West St., $14,453 — granite repaving Morris St., to Premier Constr. Co., $4,574—Hubert St., to E. G. Barry, 126-06 139th St., Laurelton, $27,060 —Great Jones St., to Leonard Paving Co., 233 Bway., $25,620—sidewalks, to J. L. Brennan, 839 Gerard Ave., $6,221. Grand total $77,928. Noted May 7.

Ohio—O. W. Merrell, Columbus, dir. hys., bituminous macadam paving 0.909 mi. Allen Co., to C. E. Edington, Findlay, $13,136—gravel surfacing 4.279 mi. Champaign Co., to W. C. Moore, Marysville, $22,954—concrete paving 10.853 mi. Adams and Brown Counties, to Brewer & Brewer Sons, Chillicothe, $366,096—0.492 mi. Coshocton Co., to Purdy Constr. Co., Mansfield, $7,483 —4.8 mi. Darke Co., to Manix Bros., Greenville, $81,005—4.704 mi. Franklin Co., to A. W. Burns Constr. Co., 424 Woodland Ave., Columbus, $21,-553—2.1 mi. Harrison Co., to Laughlin Coal & Const. Co., Inc., Canton, $71,110—0.708 mi. Sect. "T-1" Mt. Vernon-Mansfield Rd. and 1.743 mi. Sect. "T-2" same road, Knox Co., to A. J. Baltes, Norwalk, $12,588 and $36,430 respectively—6.149 mi. Logan Co., to Lauder & Son, Inc., Toledo, $103,864—5.126 mi. Putnam Co., to E. F. Miller Constr. Co., Lakewood, $115,911 —2.537 mi. Sandusky Co., to Wahl Concrete Products & Constr. Co., Vickery, $55,448—tar bound macadam paving 2.972 mi. Hancock and Hardin Counties, to F. E. Bell & Son, Findlay, $42,227—bituminous macadam paving 0.331 mi. Henry Co., to Mengerick Bros., Napoleon, $6,945 —brick paving, incl. furnishing, delivering brick 1.051 mi. Lucas Co., to McKechnie-Pierce Co., 112 East Woodruff St., Toledo, $32,464—traffic bound macadam paving 1.602 mi. Morgan Co., to Morry & Cisler, Caldwell, $24,875—brick paving 2.459 mi. Perry Co., to R. J. Dienst, 297 South High St., Columbus, $61,000—furnishing, delivering brick on same job, to Department of Public Welfare, 9th and Oak Sts., Columbus, $19,220—brick and sheet asphalt paving 0.852 mi. Richland Co., to Mansfield Asphalt Paving Co., Mansfield, $42,814. Grand total $1,137,123. Cancelled bids to have been opened May 19, concrete or waterbound macadam paving 4.829 mi. by Trumbull Co. Noted May 14.

Ohio—O. W. Merrell, dir. hys., Columbus, brick paving, incl. furnishing, delivering brick 3.938 mi. Sect. "C-2-a," "C-2-b," "D" and "South Webster" Oak Hill-Portsmouth Rd., 20 ft., Scioto Co., to C. B. Gilmore, R. F. D. 5, Jackson, $80,006. Noted May 14.

O., Cincinnati—Hamilton Co., surface treating 83 mi. various roads, 16 ft., incl. 195,000 gal. Grade 1 tar, 5,850 cu.yd. sand, cleaning 780,000 sq.yd. roads, to Eaton Oil Wks., Sterrett Ave., Covington, Ky., $34,826 est. $42,900; surface treating 74 mi. roads, 16 ft., incl. 175,000 gal. Grade 1 tar, 5,250 cu.yd. sand, cleaning 700,-000 sq.yd. roads, to L. P. Cavett Co., Lockland, $31,238 est. $38,500. Noted Apr. 9.

O., Cleveland—Stone curbing, grading, sheet asphalt (oil) paving 3,800 sq.yd. opposite 11 safety zones to Highway Constr. Co., Builders Exch. Bldg., $36,392.

O., Cleveland—To Baldwin Bros., Union Trust Bldg., grading, stone curbing, brick paving 730 sq.yd. Alexander Ave., $4,008; 11,640 sq.yd. Bartlett Ave., $49,306; 6,350 sq.yd. Cook Ave., $23,535; to Gould Constr. Co., 16311 Saranec Rd., asphalt paving 380 sq.yd. Arcade Ave., $1,831. Grand total $78,680.

O., East Liverpool—Columbiana Co., brick on concrete paving 2.14 mi. Pennsylvania Ave., 20 to 40 ft. wide, to G. B. Patterson, Wellsville, $108,803. Est. $100,000.

Oklahoma—State Hy. Dpt., Oklahoma City, 7 in. concrete surfacing 52,691 sq.yd. Federal Aid Project R-18, Sect. E, Muskogee Co., to Moran & Buckner, Muskogee, $55,040 est. $65,-000; grading, 7 in. concrete surfacing 12,277 sq.yd. Federal Aid Project 141, Sect. B, Love Co., to Ryan & Richards, Inc., 1801 East 9th St., Oklahoma City, $21,346 est. $25,000.

Okla., Oklahoma City—City Council, grading, paving 9 blocks 28th, 29th and 30th Sts. from Pennsylvania to Villa Sts., 30 ft. and 4 blocks Drexel Blvd. from 23rd to 27th Sts., 80 ft., to M. A. Swatek & Co., 5194 West Main St., $65,176 and $54,212 respectively, est. $67,000 and $55,000 respectively.

Oregon—State Hy. Comn., Portland, graveling 0.6 mi. Portland Oregon City Hy., Clackamas Co., to General Constr. Co., Colman Bldg., Seattle, Wash., $53,300; 4.9 mi. Old Oregon Trail, west unit, Baker Co., to March Constr. Co., Spokane, $51,007—5.1 mi. same road, east unit, to J. A. Tertelling & Sons, Spokane, Wash., $17,-575—5.74 mi. Fremont Hy., Lake Co., to Yonkers & Wicks, Toledo, $60,320—2.97 mi. Umqua Hy., Douglas Co., to E. M. McNutt, Eugene, $75,-064—2.64 mi. Columbia River Hy. Rock Creek Co., to T. Aruz, Portland, $68,180. Grand total $345,446.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, drainage structures 71,250 sq.yd. roads in Clarion Co., to Hagadorn Constr. Co., of West Virginia, Bridgeville, $221,540, 44,717 sq.yd. Elk Co., to H. M. McNutt, Clarion, $108,738. Noted Apr. 9.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, drainage structures, waterbound macadam surfacing 38,324 sq.yd. roads in Somerset Co., to Mt. Pleasant Constr. Co., Mt. Pleasant, $89,563. — 22,043 sq.yd. McKean and Warren Counties, to C. H. Fry Constr. Co., Erie, $61,669 —53,059 sq.yd. McKean Co., to Kirkpatrick & Wallis, Johnsonburg, $140,747. Grand total $291,979. Noted Apr. 16.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, drainage structures, waterbound macadam surfacing 53,580 sq.yd. Bethel Twp., Fulton Co., to L. M. Hutchison, Orthisonia $123,711; 99,205 sq.yd. Mead and Kinzua Twps., Warren Co., to S. J. Groves & Sons, Pittsburgh, $278,146. Noted Apr. 16.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, drainage structures, concrete surfacing 7,809 sq.yd. Route 358, Jefferson Co., to Lord & Quigley, Mifflin, $25,430. Noted Apr. 16.

Pa., Phila.—Bureau Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir., to H. Levin, 5525 Pine St., grading Windrim St., from Germantown to Wayne Sts., $1,200—to Union Paving Co., Broad and Stiles Sts., asphalt paving (assessment work), Ash St., from Almond to Belgrade Sts., Belgrade St., from Orthodox to Lefevre Sts., and from Ash to Pratt Sts., Wilmot St. from Livingston to Belgrade Sts., $13,433; asphalt repaving Haines St., from McMahon to Chew Sts., $4,250, Master St., from 2nd to Howard Sts., $6,122, Morris St., from Broad to 17th Sts., $12,716; Walnut St. from 40th to 41st Sts. $12,449, granite block repaving South St. from 2nd to Broad Sts., $8,910—to Eastern Asphalt Co., Pennsylvania Bldg., asphalt paving (assessment work) Bristol St. from Philip to 2nd Sts. $1,484, Claridge St. from Foulkrod to Harrison Sts., Foulkrod St. from Howland to Tabor Sts., Harrison St. from Claridge to Tabor Sts. and Montour St. from Mayfair to Adams Sts. $13,876, Rising Sun Ave. from Bristol St. to Hunting Park $6,415, Westmore St. from 3rd St. to North Pennsylvania R.R. $2,230—to Municipal Paving Co., 7th and Chestnut St., Wingohocking St. from Hurley to D St., $3,223—to Mazzola & Marino, 739 South 7th St., redressed granite block repaving Grays Ferry St. from 36th St. to point 210 ft. westward, $4,912—to Kaufman Constr. Co., 26 South 15th St., gunite repairs on bridges over lines of Reading Company, $4,800—to J. J. Fitzgerald, 2nd and Butler Sts., furnishing, delivering terra cotta pipe $293. Grand total $93,913. Noted May 7.

Pa., Pittsburgh — E. G. Lang, dir. Dpt. P. Wks., City-County Bldg., repaving 1,860 cu.yd. broken stone sub-base, sheet asphalt repaving 1,530 sq.yd., rein.-con. repaving 10,650 sq.yd. Beechwood Blvd., Wilkins and Dallas Aves., to M. O'Herron Co., South 1st and McKeen Sts., $45,350. Est. $61,768.

Pa., Pittsburgh—City Council, grading, curbing, guttering, sewers, sidewalks, rein.-con. paving 30,700 sq.yd. Noblestown Rd., to M. O'Herron Co., South 1st and McKean Sts., $160,031. Est. $185,000.

Pa., Port Vue—City Council, curbing, paving Elmwood Ave., to R. B. Bodkey, 917 Romaine Ave., McKeesport, $10,336; Trimble Ave., to Larson & Pohland, 1813 Sumac St., McKeesport, $10,143. Est. $25,000.

Pa., Westmont (mail Johnstown) — Boro. H. P. Shomo, secy., grading, curbing, paving 6,700 sq.yd. Park View Dr., to C. Ressler, Johnstown, $26,245; sewer pipe, to Central Contractors Supply Co., Johnstown, $1,874. Noted Apr. 23.

R. I., East Providence (br. Providence) — Town Surveyor, Town Hall, bituminous macadam paving Washburn, Goldsmith, Chauncy and Ferris Aves., to J. McCormick, 315 Taunton Ave. Est. $25,000. Noted May 15 Daily.

Tennessee—State Dpt. Hys. & P. Wks., Nashville, paving 3.6 mi. Memphis-Bristol Hy., Humphreys Co., to Ziegler Constr. Co., Amer. Trust Bldg., Nashville, $59,169. Noted May 7.

Tex., Brownsville — Cameron Co., concrete paving 28 mi. roads, 16 ft., to F. P. McElwrath, Box 727, $408,800. Noted May 7.

Tex., Houston—Harris Co., c/o H. L. Washburn, aud., grading, curbing, guttering, widening 90,000 sq.yd. Houston-La Port Rd., to Gulf Bitulithic Co., 2830 Polk Ave., $174,274 or $171,126 according to type paving used. Noted Apr. 23.

Virginia — State Hy. Comn., Richmond, one course macadam surface treating 2.541 mi. Route 39, Project F-641-EJ, Augusta Co., to Pace Constr. Co., Inc., Roanoke, $41,139; three 30 ft. span rein.-con. beam bridge over Rock Creek, Route 13, Project F-655-B1, Amherst Co., to A. N. Campbell & Co., Inc., Lynchburg, $5,574.

Washington—S. J. Humes, dir. Hys., Olympia, bituminous surface treating 111.6 mi. Grand and Douglas Counties, and 61.8 mi. Wenatchee Co., to Standard Asphalt Paving Co., 603 Chronicle Bldg., Spokane, $109,890 and $83,-424 respectively—clearing, grubbing, grading 1.25 mi. Kitsap Co., and crushed stone surfacing 31.7 mi. Kitsap Co., to W. H. Yeager, Jr., 2507 Capitol Way, Olympia, $22,685 and $14,860 respectively—10.8 mi. Clallam Co., to E. P. Doolittle, Woodinville, $8,145—grading, concrete paving 4.491 mi. Walla Walla Co., to J. H. Collins & Co., Colville, $110,436. Grand total $349,440. Rejected bids May 12, improving 128.8 mi. Spokane, Lincoln and Adams Counties. Will readvertise. Noted May 7.

Wisconsin—State Hy. Comn. and Hy. Com. Fond du Lac Co., Fond du Lac, to Larsen-Morgan Constr. Co., Oshkosh, concrete paving 21,-880 sq.yd. Mount Calvary-Calvary Rd., Co. Trunk W. W., State Project 2084, $48,136; 3,650 sq.yd. Relocation on State Trunk Hys. 55 and 31, S.A.P. 2958, $8,204—to J. A. Zielke, Oakfield, grading, draining 0.5 mi. South Byron-South Rd. Co. Trunk "AY," $1,364; 0.5 mi. Kinwood-South Rd. Co. Trunk "YY," $882; 3.78 mi. Seven Mile-Creek-Oakfield Rd., Co. Trunk "Y," $8,358—to M. A. Leiberg, Oakfield, 4.19 mi. Empire-Forest Rd., S.P. 2052, $16,620. Grand total $83,564.

Wisconsin—State Hy. Comn. and Hy. Coms. Marquette, Walworth, and Waukesha Counties, Madison, grading 4.76 mi. Marquette Co., to A. B. Lynch, 1012 North 3rd St., Milwaukee, $92,494—concrete surfacing 2.764 mi. Waterford-Mukwonago Rd., to J. D. Bonness, Inc., 541 48th St., Milwaukee, $53,249—7.239 mi. Walworth and Waukesha Counties, to J. O. Legried, Stoughton, $136,048. Grand total $281,791. Noted May 7.

Wisconsin — State Hy. Comn. and Hy. Com. Door, Kewaunee, Brown, Manitowoc, Shawano and Outagamie Counties, Madison, graveling 0.975 mi. Shiocton-Bear Creek Rd., to L. R. Pierce, Appleton, $11,697 — concrete paving 15.847 mi. Door Co., to J. F. Bloomer, Appleton, $350,098 — 9.325 mi. Kewaunee Co., to Jorgenson Constr. Co., Denmark, $220,408 — 8.0572 mi. Marinette Co., to Koepke Bros., Appleton, $227,452 — constructing Embrass River Bridge, to Zendala Consrt. Co., Manitowoc, $24,699. Grand total $834,354. Noted May 7.

Wisconsin—State Hy Comn. and Hy. Coms. of Iron, Vilas, Douglas and Bayfield Counties, Madison, to Peterson Constr. Co., 502 Globe Bldg., Minneapolis, Minn., grading, graveling Woodruff-Hurley Rd., Iron Co. $39,662—to V. Nelson, Superior, grading, concrete paving 5.61 mi. Antigo-Eagle River Rd., Vilas Co. $132,544; 0.346 mi. New Intersection Rd., Douglas Co., $7,762—to J. R. McLean, Superior, 5.86 mi. Luck-Cumberland Rd., $25,667; 8.363 mi. Bruel-Iron River Rd., Douglas and Bayfield Counties, $63,621—to Schuster Constr. Co., Denmark, 10.734 mi. Bay Settlement-Dykesville and Dykesville-North County Line Rds., $303,139—to M. Martin Co., Berlin, 10.86 mi. Sheboygan Falls-South County Line Rd., $270,951—to Wunderlich & Bleich, Appleton, Twin Bridge, $6,396; Graf Bridge $4,703; Waukau Bridge, $4,274; Bergman Bridge, $3,108. Grand total $861,827. Noted May 7.

Wisconsin—State Hy. Comn. and Hy. Com. Crawford Co., Prairie du Chien, to E. A. Sturmer, Bloomington, crushed stone surfacing 2.200 cu.yd. Town of Wauzeka, $3,102; 3,000 cu.yd. Co. Trunk Hys. S and W. $4,110; 14,175 cu.yd. State Trunk Hys. 35, 61 and 131 $17,152 —to Fuller Bros., Randolph, shale base course surfacing 3,000 cu.yd. roads in Haney $1,350; 2,500 cu.yd. Soldiers-Grove-Gay Mills Rd. $1,000. Grand total $26,714.

Wis., Appleton—City, constructing Ida St. and River Dr., to F. P. Caughlin, 1735 Fullerton Ave., Chicago, Ill., $2,935 and $31,920 respectively—Verbrick and South River Sts., to Moher & Didier, Kenosha, $4,085 and $24,-362 respectively. Grand total $63,302.

Wis., Black River Falls—Jackson Co., grading Osseo-Alma Center Rd., County Trunk A.

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Streets and Roads (Continued)

Northfield, and Augusta York Rd., County Trunk G, State Project 5244, Garfield, to M. Olsen, Hixton, $255 and $2,341 respectively—5.8 mi. Taylor-Black River Falls Rd., Springfield, to P. Hoagenson, Black River Falls, $2,811—Melrose-Black River Falls Rd., Co. Trunk Hy. H, Irving, and Ettrick-North Bend Rd., Co. Trunk V, North Bend, to L. H. Jessup, Black River Falls, $3,291 and $3,237 respectively — Black River Falls — Alma Center Rd., S.T.H .27, Alma to Kelly Constr. Co., Taylor, $2,300. Grand total $14,234.

Wis., Milwaukee—City Comrs., to Wisconsin Sewer & Constr. Co., 2246 South 35th St., grading, paving alley between East Russell and East Selley Sts., $1,758; alley between North 31st and North 32nd Sts., $1,827; alley between North Parkway and North 18th Sts., $9,309; West Fairmount Ave., $8,711; West Townsend St. $5,315; North 55th St. $40,450; West Roosevelt Dr. $9,886; West Roosevelt Dr. $11,266—to A. J. Koch, 1297 Cramer St., South 32nd St., $15,612. Grand total $104,135.

Wis., Milwaukee—Dpt. P. Wks., paving alley between North 4th and North Hopkin Sts., to A. E. Retzlaff, 2406 North Palmer St., $438—alley between North 77th and 78th Sts. and West Lisbon Ave., to J. C. Bluhm & Son, 1299 Achilles Ave., $1,847 and $2,097 respectively—East Rhode Island Ave., to Gumz & Switalski, 2065 South 18th St., $4,690—North Story Parkway, to F. Gaglicano, 1513 North Jackson St., $1,963—North Jackson St. and South Howell Ave., to W. F. Hunt, 759 North Bway., $3,792 and $24,181 respectively. $39,008.

Wyoming—State Hy. Comn., Cheyenne, grading Evanston-Randolph Rd., to Wheelwright Constr. Co., Ogden, Utah, $50,435—surfacing Green River-Granger Rd., to T. J. Tobin Constr. Co., Sioux Falls, S. D., $7,911; bituminous macadam paving Worland Streets, to Woodward Constr. Co., Rock Springs, $72,208—bridges on Evanston-Randolph Rd., to G. M. Carruth & Son, Evanston, $31,718—bridges on Sheridan-Ucross Rd., to Rogestead & Olson, Casper, $6,496—bridge on Rock River-Bosler Rd., to C. O'Neill, Fort Steele, $11,211—bridge on Kemmerer-Big Piney Rd., to Green River Lumber Co., Green River, $2,172—on Garland-Deaver Rd., to C. M. Smith, Thermopolis, $1,785. Grand total $183,936. Rejected bids grading, surfacing Cheyenne-Laramie Rd.

B. C., Vancouver—Warrenite paving, to Carter-Halls-Aldinger Co., 510 Hastings St. W., $1,767; 6 in concrete paving, to G. W. Ledingham & Co., 348 East 8th Ave., $37,355.

Ontario—Dpt. P. Hys., Parliament Bldgs., Toronto, A. A. Smith, deputy minister, mixed macadam paving 3.2 mi. Woodbridge, westerly, Contr. 31-34, to Storms Contg. Co. Ltd., Confederation Life Bldg., Toronto—7.8 mi. Frontenac Co., Contr. 31-35, to McGinnis & O'Connor, Barriefield Ave., Kingston—1.75 mi. Fonthill to Turners Corners and 2.25 mi. Blackhorse Corners to Thorold, Contr. 31-36, to Brennan Paving Co. Ltd., 400 Gage Ave. N., Hamilton—steel, concrete overhead bridge north of Orillia, Contr. 31-41, to Patterson Constr. Co., Brampton. Est. $300,000.

Ont., Beeton — Concrete and asphaltic macadam paving 20,100 sq.yd. and constructing 3,600 lin.ft. storm sewers, to Brennan Paving Co. Ltd., 400 Gage Ave. N., Hamilton. Est. $50,000.

Ont., Forest Hill—Village, concrete curbing, guttering, brick block paving 3,000 sq.yd. and hot mix asphalt paving 16,500 sq.yd., to Constructing & Paving Co., Confederation Life Bldg., Toronto, $75,150. Noted Apr. 30.

Ont., Simcoe—Norfolk Co. Council, road improvements some concrete work, day labor under supervision G. R. Marston, co. engr., Simcoe.

Ont., Toronto—R. C. Harris, city engr., asphalt paving Mona Ave., to MacNamara Constr. Co. Ltd., 53 Yonge St., $3,778—Elm Rd., to Godson Contg. Co. Ltd., 203 Richmond St. W., $38,998—concrete sidewalks on Cleveland St. and Eglinton Ave., to P. Delgreco, 60 Montclam Ave.—Elmsthorp Rd., Towntree and Roselawn Aves., to E. Mark, 1903 Davenport Rd. Comn., 57 Adelaide St. W., penetration macadam paving 1.25 mi. Aurora easterly, Contr. 4-31, to Law Constr. Co. Ltd., 225 Sterling Rd.—waterbound macadam paving 2 mi. Mount Albert westerly, Contr. 5-31, to A. E. Jupp Const. Co. Ltd., 170 Berkely St.—grading on 4th concession of Markham Twp., Contr. 6-31, to W. A. MacKey, 469 Willard Ave. Est. $50,000.

Ont., Toronto—Asphalt paving Banff Rd., to Rayner Constr. Co. Ltd., 159 Bay St., $7,762—Bilings Ave. and Kerr Rd., to Kilmer & Barber Ltd., Harbor Bldg., $15,378—concrete paving 2 lanes, to P. Delgreco, 60 Montcalm Ave., $3,450. Grand total $26,590.

Ont., Toronto—Asphalt paving Dawlish and Pine Aves., to Law Constr. Co., 25 Sterling Rd., $21,322—asphalt paving Hilda Ave. and asphaltic concrete paving Yonge St., to Godson Constr. Co., 203 Richmond St. W., $7,933 and $9,272 respectively—concrete sidewalks on 12 streets, to J. Martello, 18 Strathearn Blvd., Mitchell Bros., 167 Wallace Ave., Kilmer & Barber, Harbor Bldg., and T. E. Lane, 37 Yorkville. Total est. $60,000.

Ont., Toronto—Asphaltic concrete and brick block paving Keewatin Ave., Sect. A, to Kilmer & Barber, Harbor Bldg., $2,345—Keewatin Ave., Sect. B, to L. P. Acri, 28 Grove Ave., $4,789—asphalt paving Frederick St., to Godson Constr. Co. Ltd., 203 Richmond St. W., $6,678—Rankeigh Ave., to R. C. Hoffman Constr. Co., 331 Bay St., $13,864—concrete paving 2 lanes, to P. Delgreco, 60 Montcalm Ave., $2,581. Grand total $30,257.

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Ont., Toronto—East York Twp., hot mix asphalt paving 11,200 yd. Pape Ave., to McNamara Constr. Co., 53 Yonge St. .Est. $25,000.

Ont., Toronto—East York Twp., paving, to Gordon Crushed Stone Co., Confederation Life Bldg., $120,613.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Arkansas—Bd. Comrs. D. D. 7, at Marked Tree, preliminary plans widening floodway 2 mi. between St. Francis Lake through Poinsett and Cross Counties to St. Francis River. $750,000. Morgan Eng. Co., Goodwin Institute Bldg., Memphis, Tenn., engrs.

Ind., Hartford City—Bd. Comrs. Blackford Co. W. H. Hriday Ditch. $27,150. W. A. Brown, Hartford City, engr.

Ind., Plymouth — Bd. Comrs. Marshall Co. J. D. Johnson Ditch. $26,420. O. H. Weber, Plymouth, co. aud.

Ind., Warsaw—Bd. Comrs. Kosciusko Co., Arthur Thomas and Dudley Ditches. $25,000. W. Taylor, Warsaw, engr.

Ind., Winchester—Bd. Comrs. Randolph Co. S. H. Bussear Ditch. $28,210. A. Purdy, Winchester, co. engr.

Ia., Onawa—Bd. Comrs. Monona Co., W. R. Jones, aud., preliminary plans drainage work on West Fork Creek, incl. 1,000,000 cu.yd. excav. $50,000. R. V. Fairchild, Onawa, engr.

Ia., Sioux City — City Council, c/o E. V. Moone, clk., straightening Perry Creek 6 blocks to eliminate floods, new channel 2,000 ft. long, 14 ft. wide at bottom, 50 ft. wide at top, 18 ft. deep. $50,000. L. Hintgen, city engr.

Mass., Boston—City, Park Dpt., retaining wall, East Eagle St., East Boston. $25,000.

Minn., Anoka—Anoka Co., E. A. Carlson, aud., 5,000 acre reclamation project. S. A. Norling, 343 Gateway Bank Bldg., Minneapolis, engr.

N. J., Forked River—Bd. Commerce & Navigation, Trenton, dredging 100,000 cu.yd., to deepen main channel Forked River, from Eno Hotel to main shore road. $49,000. V. Gelineau, Trenton, engr.

Tex., Brownsville — Brownsville Navigation Dist., c/o Z. A. Rosenthal, 1,000 ft. square turning basin and 17 mi. navigation canal, 25 and 200 ft. wide, to connect with outer channel, near here. R. J. Cummings, Bankers Mortgage Bldg., Houston, engr. Noted Apr. 10, 1930.

Tex., Harlingen—Cameron Co. Water Impvt. Dist. 19, c/o W. Trimpe, pres., irrigating 10,000 acres land. $1,000,000. Boundaries of district to be voted on June 16. A. Tamm, 209½ West Jackson St., engr. Noted May 7.

BIDS ASKED

Louisiana—June 16, by State Bd. Engineers, New Orleans, levee from Ostrica to Machello, left bank Mississippi River, incl. 70,000 cu.yd. excav., Plaquemines Parish, drainage of 110 mi. borrow pits left bank Mississippi River, from Baton Rouge to New Orleans, 60,000 cu.yd. excav., Pontchartrain Levee Dist.; drainage borrow pits, restoring wave wash, right bank Mississippi River, from Donaldsonville to Raceland, 16,000 cu.yd. excav., Lafourche Levee Dist.

Mass., Boston—June 11, by Park Dpt., 33 Beacon St., excavation, drainage, filling at Smith's Pond Playground, Hyde Park. $25,000.

Tex., Houston—Harris Co. Navigation Dist., c/o J. R. Wait, dir. of Port Houston, bids about June 14, general revision substructure of wharves, replacing present wood piling with rein.-con. piles, changing structures. $135,000.

Ont., Toronto—June 5, by N. Desjardins, secy., Ppt. P. Wks., Ottawa dredging 48,000 cu.yd. silt and sand, eastern entrance Toronto Harbor, incl. towing of plant to and from work. $20,000.

CONTRACTS AWARDED

Calif., San Francisco—Roman Catholic Archbishop, 1100 Franklin St., 173,000 cu.yd. rock and sand excav. on school site, to M. Rosenberg, 1755 San Bruno Ave. Noted May 14, under "Schools."

Ind., Shelbyville—See "Power Plants."

Ia., Clinton—Bd. Comrs. Clinton Co., dragline cleanout and enlargement work, incl. 130,000 cu.yd. open ditch, 4.5 mi. to Independent Dragline Co., Calamus, $8,424. Noted Apr. 16.

Me., Kennebunk—Town, Bd. Selectmen, to W. H. Nedeau, Sea Rd., 300 cu.yd. concrete sea wall $15 per yd., 80 yd. rubble masonry retaining wall $65, piling $65 per 1,000.

Massachusetts—Metropolitan Dist. Comn., 20 Somerset St., Boston, sea wall and shore protection at Winthrop and Revere, to T. F. McCarthy, 342 Bway., Revere, $6,173. Noted May 7 Daily.

Mass., Rockport—Dpt. P. Wks., A. W. Dean, engr., Boston, dredging 31,000 cu.yd. 2 areas in Rockport Harbor to depth of 7 ft. mean low water, to Bay State Dredging & Contg. Co., 62 Condor St., East Boston, $15,520. Noted Mar. 12.

Miss., Greenville—Mississippi Levee Comrs., L. H. Gaines, pres., Black Bayou Drainage Canal, incl. 100,000 cu.yd. excav., near here, to E. F. Powers Constr. Co., 318 Harvey Bldg., at $0.06 per cu.yd.

N. Y., Brooklyn — Dpt. Docks, Pier "A," Battery Pl., New York, dredging slip along west side pier, west of North Henry St., Whale Creek, to Great Lakes Dredge & Dock Co., 17 Battery Pl., New York, $10,900. Noted May 21.

N. Y., New York—M. Cosgrove, comr. Docks, Pier "A" Battery Pl., dredging, depositing, riprap and back fill Latting St., easterly side Westchester Creek, to Kearns Eng. Corp., $21,800; dredging north side Pier 5, Contr. 2030, to Great Lake Dredge & Docks, 17 Battery Pl., $7,290. Noted Apr. 30.

Bond Elections

Bonds Voted

Waterworks Extensions. — Fairfield, Calif., $42,000. A. M. Jensen, San Francisco, engr.
Waterworks Impvts. — Kansas City, Mo., $3,500,000.
Sewers, Pumping Station and Equipment—Kansas City., $1,500,000.
Toll Bridge (between Bettendorf, Ia. and Moline, Ill.)—Davenport, Iowa, $1,750,000.
City Hall, Police and Fire Stations, Auditorium—Kansas City, Mo., $9,500,000.
Hospitals—Kansas City, Mo., $2,000,000.
Court House — Independence and Kansas City, Jackson County, Mo., $4,200,000.
Detention House — Jackson County, Mo., $250,000.
Traffic Ways, Parks, Playgrounds, River Control, etc.—Kansas City, Mo., $17,300,000.

Bonds Defeated

Waterworks Extensions and Sewerage Impvts.—Brawley, Calif., $60,000.
Power Plant—Brawley, Calif., $150,000.
Airport—Peoria, Ill.

Coming Bond Elections

Waterworks Impvts.—West Monroe, La., June 2, $75,000.
Waterworks Impvts. — Redwood Falls, Minn., June 9, $34,000.
Water Tower, etc.—Two Harbors, Minn., $80,000.
Waterworks, Sewers and Paving — Longview, Tex., $120,000.
Storm Sewer—Miami, Ariz., June 10, $95,000. D. Travini, City engr.
Natural Gas System — Wellington, Tex., June 23, $80,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Alabama and Mississippi—DREDGING—U. S. Eng., Mobile, Ala., 3,400,000 cu.yd. in Mississippi Sound and Anchorage Basin at Gulfport, Miss.

Ark., North Little Rock — POST OFFICE — Treas. Dpt. at office Sup. Archt., soon takes bids concrete, brick, northwest corner City Park, $110,000.

Calif., Sacramento—DREDGING—U. S. Eng., 1,435,500 cu.yd. in Stockton Channel.

Colo., Montrose—POST OFFICE—Treas. Dpt. at office Sup. Archt., rejected bids Apr. 16, general contract U. S. Post Office, $175,000. Will readvertise. Noted Apr. 30.

Conn., Clinton—POST OFFICE—Treas. Dpt. at office Sup. Archt., federal building, $75,000.

Conn., Torrington — POST OFFICE — Treas. Dpt. at office Sup. Archt., U. S. Post Office, $200,000.

Conn., Winsted—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, $115,000.

D. C., Wash.—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Graham, Anderson Probst & White, 80 East Jackson Blvd., Chicago, Ill., extending, remodeling, enlarging U. S. Post Office.

La., Baton Rouge — POST OFFICE, etc. — Treas. Dpt. at office Sup. Archt., plans by M. H. Goldstein, Amer. Bank Bldg., rein.-con., brick, stone post office and federal building, Florida and St. Anthony Sts. $500,000. Noted Dec. 18.

Mass., West Springfield — POST OFFICE — Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Mich., Bay City—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., soon takes bids U. S. Post Office, Court House and Custom House, $475,000. Noted Apr. 16.

Neb., Omaha—FEDERAL BUILDING—Treas. Dpt., at office Sup. Archt., plans by Kimball, Steele & Sandham, 836 World-Herald Bldg., and G. B. Prinz, 1037 Omaha Natl. Bank Bldg., assoc. archts., concrete, brick, stone, 15th and Dodge Sts. $250,000.

Nev., Reno—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by F. J. DeLongchamps, Gazette Bldg., Reno, post office. To exceed $200,000.

N. J., Paterson—POST OFFICE—Treas. Dpt. at office Sup. Archt., bids in July, 2 story, basement, brick, steel, rein.-con., Ramapo Ave., Market and Straight Sts. $800,000. F. W. Wentworth & F. J. Vreeland, 140 Market St., archts. J. A. Wetmore, Treas. Dpt., Wash., D. C., assoc. archt. Noted May 7.

Pa., New Kensington—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by P. R. L. Hogner, Smithfield Bldg., Pittsburgh, 1 story, basement post office, $285,000. Noted Apr. 16.

R. I., Bristol—WHARF—Superintendent Lighthouses, Staten Island, N. Y., 70 x 300 ft; concrete, creosoted pile wharf.

Tex., Brownsville — POST OFFICE — Treas. Dpt. at office Sup. Archt., twenty 2 story officers' quarters, Fort Brown. Private plans.

Tex., Harlingen—POST OFFICE—Treas. Dpt. plans by I. D. Porter, resident archt., Federal Bldg., Dallas, 1 story post office, $170,000. J. A. Wetmore, Wash., D. C., acting superv. archt. Noted Feb. 26.

Federal Government Work (Continued)

Tex., San Angelo—POST OFFICE—Treas. Dpt. at office Sup. Archt., post office annex, East Twonig and Lakes Sts. $200,000.

Tex., Wichita Falls — POST OFFICE and FEDERAL BUILDING—Treas. Dpt. at office Sup. Archt., soon takes bids 3 story, basement post office, 60,000 sq.ft. floor space, $500,000. Voelcker & Dixon, 207 Perkins Snider Bldg., archts. Noted Feb. 5.

Wis., Lynxville—PROTECTION WORK—U. S. Eng., 615 Commerce Bldg., St. Paul, Minn, soon takes bids 30,000-50,000 cu.yd. rock and brick shore protection work along Mississippi River.

BIDS ASKED

Ala., Mobile—DREDGING—June 20, by U. S. Eng., 5,620,000 cu.yd. in Mobile Bay Channel; adv. E.N.-R. June 4. Noted May 21.

California — ROAD — June 11, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, grading 10.252 mi. Sect. A, Route 77, Mount Shasta-Mount Lassen Natl. Forest Hy., Shasta Co.

Calif., San Francisco—PAVING—Con. Q. M., Fort Mason, taking bids asphalt paving, widening 1 mi. road through Natl. Cemetery, 27 ft.

Colorado—ROAD—June 9, by Pub. Rds., Denver, grading, crushed rock or gravel surfacing 41,500 cu.yd. North and South Hy., in Mesa Verde Natl. Park, Montazuma Co. A. E. Palen, Denver, dist. engr.

Del., Reedy Island—ELECTRIC DISTRIBUTION SYSTEM, etc.—June 12, by Treas. Dpt. at office Sup. Archt., installing electrical distribution system, conduit and wiring, lighting fixtures, submarine cable for electric service at U. S. Quarantine Station.

D. C., Anacostia — BARRACKS, etc. — Spec. 6494—June 17, by Yards & Docks, Navy Dpt., barracks and boiler plant at Naval Air Station.

D. C., Wash.—CLEARING SITE—June 16, by Treas. Dpt. at office Sup. Archt., clearing site at U. S. Post Office Dpt. Building.

D. C., Wash.—HEALTH SERVICE BUILDING—June 16, by Treas. Dpt. at office Sup. Archt., clearing site, excavating, founds., for U. S. Public Health Service Building; adv. E. N.-R. June 4.

Fla., Lake City — WATER SUPPLY — June 16, by Treas. Dpt. at office Sup. Archt., water supply.

Ga., Brunswick—HEATING BOILER—June 23, by Treas. at office Sup. Archt., heating boiler, plumbing, heating, in Post Office.

Illinois—EARTHWORK—June 20, by U. S. Eng., 428 Customhouse, St. Louis, Mo., 287,000 cu.yd. earthwork, rebuilding, enlarging levee in South Beardstown Drainage and Levee Dist., Cass Co. on Illinois River; adv. E.N.-R. June 4.

Ill., East St. Louis—ELEVATOR—June 17, by Treas. Dpt. at office Sup. Archt., installing one passenger elevator.

Ill., Freeport — ELEVATOR — June 18, by Treas. Dpt. at office Sup. Archt., passenger elevator in U. S. Post Office and Court House; adv. E. N.-R. June 4.

Ill., Freeport—POST OFFICE—June 18, by Treas. Dpt. at office Sup. Archt., U. S. Post Office extension. $275,000.

Ind., Lafayette—POST OFFICE—June 26, by Treas. Dpt. at office Sup. Archt., U. S. Post Office (except elevator, dumbwaiter, lighting fixtures); adv. E.N.-R. June 4. Noted Apr. 9.

La., Shreveport—ELEVATOR—June 17, by Treas. Dpt. at office Sup. Archt., installing 1 freight elevator in U. S. Post Office.

La., Shreveport—POST OFFICE—June 17, by Treas. Dpt. at office Sup. Archt., U. S. Post Office. $350,000.

Mass., Boston—RIPRAPPING—June 30, by U. S. Eng., Customhouse, riprapping banks Cape Cod Canal; adv. E.N.-R. June 4. Noted Aug. 21.

Missouri—PILING DIKES—June 6, by U. S. Eng., 428 Custom House, St. Louis, 1,000 to 2,200 ft. piling dikes in Missouri River at Bonhomme Bend.

Mont., Babb-Piegan—INSPECTION STATION—June 15, by Treas. Dpt. at office Sup. Archt., inspection station. $59,000. Noted Apr. 30.

Mont., Helena—HOSPITAL—July 13, by Vet. Bu., Arlington Bldg., U. S. Veterans Hospital.

N. Y., Castle Point—RESERVOIR—June 16, by Vet. Bu., Arlington Bldg., 200,000 gal. concrete reservoir.

Nev., Boulder City—STREETS, etc.—June 30, by Bureau Reclamation, Las Vegas, street, alley, parking area, sidewalk grading, street paving, street and parking area surfacing, etc., for Boulder Canyon Project, Arizona-California-Nevada, E. Mead, consr.; adv. E. N.-R. June 4.

O., Akron—POST OFFICE—June 9, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Pa., Middletown—WAREHOUSE—June 9, by U. S. Eng., remodeling, completing warehouse.

Pa., Phila.—DIKE—June 10, by U. S. Eng., 14,000 lin.ft. earth dike near Alloway Creek.

Pa., Phila.—DREDGING—June 19, by U. S. Eng., 35 South 9th St., 63,000 cu.yd. in Delaware River at Fort Mifflin.

Pa., State College—REMODELING, etc.—June 18, by Treas. Dpt. at office Sup. Archt., remodeling, enlarging U. S. Post Office; adv. E. N.-R. June 4.

R. I., Newport—ELEVATOR—Spec. 6519—June 17, by Yards & Docks, Navy Dpt., elevator at Goat Island Naval Torpedo Station. Private plans.

R. I., Quonset Point—TENT FLOORS, etc.—June 8, at office U. S. Property and Disbursing Officer, State House, Providence, 102 tent floors, extending water and sewerage systems.

S. C., Parris Island—WATER TANK—Spec. 6539—June 10, by Yards & Docks, Navy Dpt., elevated water tank.

Tex., El Paso—PRISON—June 24, by Bureau Prisons, Dpt. Justice, federal house of detention. Noted May 21.

Tex., Forth Worth—POST OFFICE—July 2, by Treas. Dpt. at office Sup. Archt., U. S. Post Office (except elevators, dumbwaiters, lighting fixtures); adv. E.N.-R. June 4. Noted May 21.

Tex., Houston—ELEVATOR PLANT—June 16, by Treas. Dpt. at office Sup. Archt., elevator plant in U. S. Post Office and Court House.

Tex., San Antonio—HANGAR—June 16, by Con. Q. M., 2 air corps hangars, each to have 1 annex and 1 compressor room, at Duncan Field.; adv. E. N.-R. June 4. Noted Jan. 15.

Va., Fort Myer—QUARTERS—June 16, by U. S. Eng., 4 double company officers quarters with garage and 6 double non-commissioned officers' quarters with garages.

Va., Quantico—ROADWORK—Spec. 6464—June 10, by Yards & Docks, Navy Dpt., roadwork.

Va., Richmond—DREDGING—June 30, by U. S. Eng., 59,585 cu.yd. maintenance dredging in James River; adv. E. N.-R. June 4.

Va., Yorktown—GRADING, etc.—June 18, at office Natl. Park Serv., Dpt., Agriculture, Pub. Rds., grading, structures 7.9 mi. hy.; adv. E.N.-R. June 4.

Va., Yorktown—WHARF and PIERS—June 5, by Dpt. Interior, Natl. Park Serv., repairing commercial wharf, and constructing 3 small piers to reach Navy barges, which will be used as landings for small boats during the Yorktown Sesquicentennial Celebration.

Vt., Rutland—POST OFFICE—June 16, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E. N.-R. June 4.

Wash., Cle Elum—DAM—July 10, by Dpt. Interior, 135 ft. rock and earth fill dam, on Yakima Reclamation Project. Noted May 7.

CONTRACTS AWARDED

Ala., Montgomery—QUARTERS—Con. Q.M., 3 double sets non-commissioned officers' quarters, Maxwell Field, to A. Blair, 1st Natl. Bank Bldg., Montgomery, $38,089. Noted Apr. 9.

Colorado — BRIDGE — Pub. Rds., Denver, bridge on Mount Evans Forest Hy., Clear Creek Co., to Lindstrom & Son, Boulder, $24,547.

D. C., Wash.—EXCAVATION—Treas. Dpt. at office Sup. Archt., excavation, constructing fence for Archives Building, to Udelson Excavating & Wrecking Co., 3025 Kensington Rd., Cleveland, O., $27,390. Noted May 14.

Ga., Augusta—ROADS—Con. Q.M., curbing, paving 2,296 sq.yd. roads at U. S. Arsenal, to Claussen-Lawrence Constr. Co., 1394 Gwinnett St.

Idaho—ROAD—Dpt. Agriculture, Pub. Rds., Ogden, Utah, grading 187,700 cu.yd. Idaho City-Lowman Rd., Boise Co., to Ryberg, McHugh & Cowley, Boise, $104,358; 0.218 mi. Elk City Hy., Nezperce Co., to Ora Bundy, Ogden, Utah, $27,242. Noted May 14.

Illinois—METAL WORK—U. S. Eng., 1st Chicago Dist., metal work for Brandon Rd. and Dresden Island, to Independent Bridge Co., Neville Island, Pittsburgh, Pa., $649,209. Noted Apr. 9.

Ill., Rock Island—LEVEES—U. S. Eng., Federal Bldg., levees on Mill Creek Cut-off and South Slough, to A. G. Black, Prophetstown, $10,140; spillways, culverts in connection with diversion Mill Creek, to Priester Constr. Co., Davenport, Ia., $27,610. Noted Apr. 23.

Kan., Fort Leavenworth—HOSPITAL—Con. Q. M., 2 story, basement, 50 x 50 ft., concrete, brick, to Huff Bros., Pittsburg, Kan., $53,680. Noted Apr. 16.

Mass., Chelsea—HEATING, etc.—Treas. Dpt. at office Sup. Archt., heating hospital addition, to D. Mazza Co., 282 Park St., Medford; plumbing, to Lappin Bros. Co., 8 Union St., Malden; electrical work, to Whalen & Bennett, 4 Washington Ave., Chelsea. Noted Apr. 9.

Mass., Springfield — STEEL — Commanding Officer, Springfield Armory, 200,000 lb. steel for armory, to Bethlehem Steel Co., Bethlehem, Pa., at $0.436 per ft. Noted May 7.

Miss., Vicksburg—DREDGING—U. S. Eng., one 16 in. pipe line dredge, to Dubuque Boat & Boiler Co., Dubuque, Ia., $303,000.

Miss., Vicksburg—DREDGE—U. S. Eng. new modern dredge, incl. equipment. $345,200.

Mo., Dover—DIKES—U. S. Eng., 707 Postal Telegraph Bldg., Kansas City, 5,215 ft. standard pile clump dikes and 2 600 ft. standard revetment work in Missouri River, Berlin and Baltimore Bends, to Kansas City Bridge Co., B.M.A. Bldg., Kansas City, $333,600. Est. $372,669. Noted May 14 Daily.

Mo., Jefferson City—REVETMENT—U. S. Eng., 707 Postal Telegraph Bldg., Kansas City, 2,400 ft. standard revetment in Missouri River, at Murray's Bend, to E. L. McClain, 421 Crocket St., Shreveport, $40,700. Noted Apr. 9.

Mo., Kansas City — POST OFFICE — Treas. Dpt. at office Sup, Archt., 5 story post office, to Ring Constr. Co., 808 Wesly Temple Bldg., Minneapolis, Minn., $2,330,000. Noted May 7.

Nev., Hawthorne—ASPHALTIC OIL—Spec. 6516—Yards & Docks, Navy Dpt., asphalt road oil, to A. D. Drumm, Jr., Fallon, $15,413. Noted May 7.

N. Y., Canandaigua—HOSPITAL—Vet. Bu., Arlington Bldg., general contract U. S. Veterans Hospital, to L. Balkin & Co., 1850 West Austin Ave., Chicago, Ill., $899,940; plumbing, heating, electrical work, to J. L. Powers, Bennettsville, S. C., $318,000. Noted Mar. 12.

Oregon and Washington—ROAD—U. S. Eng., 321 Custom House, Portland, Ore., concrete pile dikes at Morgan Bar, on Columbia River, to Kern & Kibbie, 290 East Selma St., Portland, Ore., $23,934.

Oregon—BRIDGE—U. S. Eng., Post Office, Portland, 545 ft. bridge over Willamette River, to Lindstrom & Fiegenson, Worcester Bldg., Portland, $54,323.

Va., Langley Field—HOSPITAL—Con. Q. M., Fort Monroe, hospital at Langley Field, to Jewell Riddle Co., Sanford, N. C. $200,000 (250 days). Noted Apr. 9.

Tenn., Memphis—DERRICK—U. S. Eng., McCall Bldg., 10 ton floating whirler derrick for handling sand and gravel, to Amer. Hoist & Derrick Co., 63 South Robert St., St. Paul, Minn. Est. $12,000. Noted May 14.

Tex., Randolph Field—HEATING SYSTEM—U. S. Eng., installing central water air heating system in engineering shops, to C. Wallace Plumbing & Heating Co., 2224 Summer St., Dallas, $19,500. Noted Apr. 16.

Tex., Texas City — DIKE — U. S. Eng., Galveston, rubble mound on Texas City Dike, to W. E. Callahan Co., Kirby Bldg., Dallas, $468,820. Noted Apr. 30.

Va., Langley Field—QUARTERS—U. S. Eng., two 163 men and one 330 men barracks, to Townsend Lumber Co., Anderson, S. C., $426,500.

Wash., Everett—DREDGING—U. S. Eng., Seattle, 233,000 yd. earth from channel of Snohomish River, along east side, to Puget Sound Bridge & Dredging Co., Central Bldg., Seattle, at $0.109 per cu.yd., total $25,397. Noted May 12 Daily.

Wash., Seattle—DRAINAGE SYSTEM—Spec. 6480—Yards & Docks, Navy Dpt., storm water drainage system, to S. Macri, 217 Market St., Seattle, $20,959. Noted May 26 Daily.

Wyoming—ROAD—Pub. Rds., Custom House, Denver, Colo., grading 0.17 mi. Wind River Lava Creek Bridge Forest Project, Teton Co., to Western Bridge & Constr. Co., 3867 Leavenworth St., Omaha, Neb., $18,903. Noted Mar. 5.

RAILWAYS

PROPOSED WORK

Illinois—See "Grade Crossings, under Chicago."

Oklahoma—Atchison, Topeka & Santa Fe R.R. Co., 80 East Jackson Blvd., Chicago, Ill., G. W. Harris, ch. engr., track elevation work and station in Oklahoma City. $5,000,000.

CONTRACTS AWARDED

California—Bd. Comrs. Los Angeles Co., Los Angels, relay rails for flood control work, incl. Proposal 1 (a) 216 long tons 65 relay rail (b) 11.7 long tons second hand splice bars for rails in Item (a) (c) 3,425 lb. new bolts and nuts for items (a) and (b), (d) 14,300 lb. 5¼ x 9/16 in. spikes; Proposal 2 (a) 233 long tons 70 relay rails (b) 24.1 long tons second hand splice bars for Item (a), (a) 3,400 lb. new bolts and nuts for Items (a) and (b), (c) 14,300 lb. 5¼ x 9/16 in. spikes, to United Commercial Co., 937 East Gage Ave., $6,259; furnishing to County Flood Control Dpt., six thousand 6 x 7 in. x 8 ft. No. 1 treated O. P. ties f.o.b. truck bidders plant, to Consolidated Lumber Co., 122 West Jefferson St., Los Angeles, at $41.50 per 1,000; diamond mesh wire fencing, to Columbia Steel Co., 2087 East Slauson Ave., Los Angeles, $10,126.

Pennsylvania—W. D. Wiggins, ch. engr. (Central Region) Pennsylvania R.R. Co., Pennsylvania Sta., Pittsburgh, 2 pedestrian subways and railroad subway at Crafton Ave. and White Street Extension, Crafton, to J. F. Casey Co., Freeport Rd., Est. $490,000. Aspinwall, $400,000. Noted May 7.

SUBWAYS AND TUNNELS

PROPOSED WORK

Ill., Chicago—See "Grade Crossings."

BIDS ASKED

N. Y., Brooklyn—June 12, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, installing tracks and contact rail for part Rapid Transit R.R. Route 109, part Sect. 4, and Sects. 5A, 5B, 6 and 7.

CONTRACTS AWARDED

N. Y., New York—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., special work, Order 57, to Ramapo Ajex Corp., 230 Park Ave., $27,882; Order 60, to Bethlehem Steel Co., 25 Bway, $41,795; treated ties, Order 15, to Atlantic Creosoting Co., 17 Battery Pl., $62,012. Grand total, $131,689. Noted May 7.

Pa., Crafton—See "Railways under Pennsylvania."

Pa., Phila.—Dpt. City Transit, City Hall Annex, A. Murdock, C. E. Myers, dir., Broad Street Subway, West Philadelphia Branch, Contr. 323, rail splice bars, bolts, nutlocks, 36,200 screw spikes, 423 tons rails (100 lb. rail 62 ft. lengths), to Bethlehem Steel Co., Bethlehem, $27,429. Noted May 14.

Pa., Phila—Dpt. City Transit Co., City Hall Annex, A. Murdock, dir., Broadway Street Subway, West Philadelphia Branch, Contr. 324,

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Subways and Tunnels (Continued)

Spec. 324, incl. switches, frogs, crossings rail, steel channels, separators, joint plates, bolts, nuts, washers, to Lorain Steel Co., Johnstown. $60,688. Noted May 14.

GRADE CROSSINGS

PROPOSED WORK

Calif., Los Angeles—See "Bridges."

Ill., Chicago—Pennsylvania R.R. Co., Broad St. Sta., Phila., Pa., T. J. Skillman, ch. engr., soon takes bids elevating 2 1/3 mi. railroad tracks Englewood-58th Street Connection linking Panhandle line near Hamilton Ave. to Ft. Wayne Division near Stewart Ave., constructing subways to eliminate 32 grade crossings. $3,750,000. Part of work will be done by day labor.

N. J., Clifton—Bd. City Council, City Hall, preliminary plans pedestrian underpass at 5th St. or vehicular underpass at East 9th St., under Erie R.R. $25,000. J. L. Fitzgerald, city engr.

N. J., Clifton—Erie R.R. Co., G. S. Fanning, ch. engr., 50 Church St., New York, will not build grade crossing elimination, East 9th St. $100,000. **Project abandoned. Noted Apr. 30.**

N. J., Colonia—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., steel, concrete underpass. To exceed $150,000. **Maturity later.**

N. Y., Tonawanda—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating Sheridan Drive Crossing 3 mi. north Black Rock Sta., $197,950; Ontario Street Crossing, $385,000.

Okla., Oklahoma City — City Council preliminary plans pedestrian underpass at Lee School. $25,000. G. F. Brown, City Hall, engr.

Ont., Gobles—Dpt. P. Hys., Parliament Bldgs., Toronto, surveys concrete, steel overhead bridge on Hy. 2 over Canadian Natl. Ry. $30,000 or more. A. A. Smith, Parliament Bldg., Toronto, engr.

CONTRACTS AWARDED

N. Y., North Salem—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating Purdy's Crossing, at Purdy's Station, Westchester Co., to Bates & Rogers Constr. Co., 75 West St., New York, $84,923. Est. $122,907.

N. Y., Valley Falls—Boston & Maine R.R. Co., W. J. Backes, ch. engr., Boston, Mass., furnishing, delivering, erecting structural steel in connection with eliminating Main St. and Burton St. Crossings of railroad, to Phoenix Bridge Co., 30 Church St., New York, $24,800. Est. $28,800. Noted Oct. 16.

O., Centersburg—Pennsylvania R.R. Co., W. D. Wiggins, ch. engr. (Central Region), Pittsburgh, Pa., bridge to eliminate grade crossing on Hy. 24, to W. M. Brode Co., Centersburg, $92,000. Est. $100,000.

Pa., Pittsburgh — Pennsylvania R.R. Co., Broad St. Sta., Phila., T. J. Skillman, ch. engr., and Public Service Comn., City-County Bldg., grade crossing elimination, incl. 25,000 cu.yd. excav., 25,000 cu.yd. fill, 3,700 cu.yd. concrete surfacing, 10,000 sq.ft. brick surfacing Crafton Ave., to John F. Casey Co., Aspinwall St. Total est. $400,000.

DAMS

PROPOSED WORK

Va., Charlottesville—See "Waterworks."

CONTRACTS AWARDED

Ind., Shelbyville—See "Power Plants."

PIERS AND WHARVES

PROPOSED WORK

Calif., Long Beach—WHARF—Neptune Pier Co. 14 x 1,464 ft. trestle and 30 x 274 ft. creosoted pile wharf for 3 boat landings. R. D. Van Alstine, 410 East 9th St., Long Beach, engr.

N. J., Jersey City—DRY DOCKS, etc.—Bd. City Comrs., City Hall, preliminary plans 2 dry docks, timber bulkheads, filling in certain portions of land on Little Basin. $25,000. Morris Basin Dry Dock Co., Ft. Henderson St., lessee of land. Private plans.

Wash., Seattle—PIER—Port Comn., 600 ft. pier and transit shed, 1st unit proposed shipping terminal. $500,000. Total $5,000,000. J. P. West, ch. engr.

BIDS ASKED

La., Lake Charles—WHARF SHEDS, etc.—June 16, by Bd. Comrs. Lake Charles Harbor Terminal Dist., two 160 x 700 ft. steel wharf sheds with 200 ft. open space between 31 ft. wide front apron with 2 tracks, 2 depressed tracks in rear; 1,600 ft. creosoted pile, timber wharf, 100 ft. creosoted piles at front back half 101 ft. wide on sand fill with retaining wall in rear. $700,000. F. Shutts & Sons, Lake Charles, engrs. Noted May 21.

Tex., Houston—WHARF—June 15, by Harris Co. Navigation Co., c/o J. R. Wait, dir., Houston, repairing, remodeling substructure of Wharf 11, Houston Channel, incl. replacing present wood piling with rein.-con. piling, changing structure. $135,000.

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Tex., Port Arthur—WHARF—June 8, by U. S. Eng., Galveston, wharf improvements along Sabine-Neches Canal, in slip near here, incl. wharf revetment, clusters. $200,000.

CONTRACTS AWARDED

Mass., West Yarmouth — PIER — Englewood Beach Assn., c/o J. A. Ellis, concrete, piling, planking pier at Englewood Beach to J. A. Ellis, Main St., West Yarmouth. Est. $25,000.

Va., Richmond—WHARVES—At office R. K. Compton, dir. P. Wks., wharf construction, to A. H. Calligan & Co., Builders Exch. Bldg., $55,119.

AIRPORTS

PROPOSED WORK

Pa., Schultzville—R. B. Gibbs, soon takes bids hangar, runways, grading at airport. $250,000.

BIDS ASKED

Pa., Pittsburgh—June 9, by R. G. Woodside, controller Allegheny Co., heating, ventilating, plumbing, gasoline storage and distribution system for airport on Mifflin Rd. $88,500. Noted May 21.

CONTRACTS AWARDED

Idaho, Boise—Varney Air Lines, Inc., Seattle, Wash., 1 story, basement, brick, steel hangar, passenger station, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $50,000. Noted May 7.

GRAIN ELEVATORS

PROPOSED WORK

Kan., Salina — GRAIN ELEVATOR — Salina Grain & Milling Co., L. G. Gottschick, pres., 912 West Ash St., 56 x 120 ft. grain elevator, 113 ft. high, rein.-con., incl. 11 round tanks and 10 interstice bins.

N. Y., Albany—Albany Port Dist. Comn., 74 Chapel St., plans by MacDonald Spencer Eng. Co., Inc., 420 Lexington Ave., New York, 2,000,000 bu. grain elevator. $1,500,000. Noted Apr. 30.

CONTRACTS AWARDED

Okla., Blackwell—Blackwell Mill & Elevator Co., c/o C. D. Mixson, mgr., rein.-con. storage elevator, plain found., 500,000 bu. capacity, 14 large and 22 smaller tanks, covering 60 x 100 ft. area, 16,000 cu.yd. excav., and 150 carloads rock for found., to Burrell Eng. & Constr. Co., North Canal St., Chicago, Ill. $100,000. This corrects report in May 14 issue under "Blackwell, Tex."

POWER AND LIGHTING

PROPOSED WORK

Okla., Shidler — City, P. P. Barlow, mayor, franchise election June 23, electric light system to Oklahoma Power & Water Co., Sand Springs. $40,000. S. E. Wolff, Sand Springs, engr.

Okla., Vinita—City, franchise election June 16, natural gas system, to Vinita Fuel Co., Vinita. $40,000. Private plans. G. Karr, mayor.

BIDS ASKED

Minn., Litchfield—June 15, by Village, M. Mortenson, recdr., furnishing, installing one 750-kw. steam turbine generating unit with found., piping, wiring, $55,000. Wolff & Coates, 903 Globe Bldg., St. Paul, engrs. Former bids rejected. Noted May 25 Daily.

Mo., St. Louis—See "Contracts Awarded."

New York—June 9, by Fire Dpt., J. J. Dorman, comr., Municipal Bldg., New York, portion underground fire alarm system (cable installation only), Ridgewood and Middle Village, Queens Boro.

CONTRACTS AWARDED

Mo., St. Louis—Southwestern Bell Telephone Co., 11th and Pine St., 11,000 ft. telephone cable and 61 poles in St. Louis Hills subdivision, east and west of Francis Park, and extending Hampton Ave., underground telephone cable line from Devonshire to Marquette Aves., own forces. Private plans.

Mo., St. Louis — Union Electric Light & Power Co., 12th and Locust Sts., steam lines in 11th, Carr and Biddle Sts., own forces. Private plans.

New York—New York Power & Light Co., subsidiary Niagara-Hudson Power Co., 15 Broad St., New York, 300 mi. Copperweld cable for transmission lines (now under construction) from Yonkers to Poughkeepsie, to Copperweld Steel Co., Glassport, Pa. Noted Mar. 19.

Tex., Beaumont—City, c/o F. A. Fletcher, Beaumont, 6 mi. power line, to Gulf States Utilities Co., Beaumont, $26,500.

PARKS AND SPORTS

PROPOSED WORK

Calif., Redwood City—Fair Oaks Racing & Polo Club, c/o G. Normile, St. Francis Hotel, San Francisco, plans by A. Moore, 277 Pine St., San Francisco, racing course, incl. clubhouse, administration building, grand stand, stables, other structures, horse racing tracks, polo grounds (Mission Type architecture), Woodside Rd. $1,000,000.

N. J., Deal—Bd. City Comrs., City Hall, 2 story bath house, on 300 x 900 ft. side, Philips and Ocean Aves. $150,000. **Maturity about September.** Architect not selected. Noted May 7.

N. J., Edgewater—Bd. Boro Council, Boro Hall, will not build public playground, adjacent to municipal building, River Rd. $25,000. Project abandoned. W. Delehanty, boro engr. Noted Apr. 9.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, plans by C. W. Martin, Flatbush Ave. extension and Concord St., field house, bleachers and storeroom, Guilder and Ocean Park Aves. To exceed $40,000.

BIDS ASKED

Conn., Bloomfield—Olmsted Bros., landscape archts., 99 Warren St., Boston, Mass., taking bids athletic field, incl. 6 tennis courts, 2 baseball diamonds, running track for St. Thomas Seminary.

Mass., Boston—June 5, by Park Dpt., 33 Beacon St., wooden shelters on playgrounds and parks throughout city as specified. $25,000 or more.

Mo., St. Louis—See "Streets and Roads."

N. Y., Brooklyn—June 9, by Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, comfort station, Owls Head Park, Colonial Rd. and 68th St.; improving Lincoln Terrace Park, Eastern Parkway, and Buffalo Aves.; hydraulic fill in 2nd section Marine Park.

O., Cleveland—National Air Races, C. Gildersleeve, dir., 227 West Superior Ave., bids about June 9, 800 ft. grand stand, 32 tiers high, 26 x 208 ft. administration building, both timber, stucco, at Cleveland Airport. L. L. Baldwin, c/o owner, engr.

CONTRACTS AWARDED

Ill., Quincy—See "Schools."

Ia., Boone—City, c/o O. Hill, clk., 60 x 140 ft. swimming pool, 40 x 40 ft. wading pool, sand beach, brick, concrete bath house, to Lippert Bros., Boone; plumbing, to W. L. Anderson Plumbing & Heating Co.; electric wiring, to M. F. Gustafson. Est. $25,000. Noted Feb. 10.

Mass., Marblehead—Town, F. R. Doliber, 1 story, timber, concrete pavilion, Seaside Park, to T. Stacey, Washington St. Est. $25,000 or more. Noted May 28.

Mass., Wareham—Cape Cod Amusement & Realty Co., c/o E. S. Smith, archt., 33 Cornhill, Boston, 2 story, timber, open construction amusement, ballroom, bowling alleys, Onset Ave. and 10th St., to W. H. Sargent, 560 Harrison Ave., Boston. Est. $25,000.

N. J., Newark—Bd. Educ., Education Bldg., grading, concrete work, retaining walls, for playground, at Garfield School, to North Seventh Constr. Co., 346 North 6th St. Est. $25,000.

New York—Park Bd., W. R. Herrick, pres., Park Dpt., Arsenal Bldg., Central Park, New York, improving east side Shore Rd., Brooklyn, to T. McMillen Contg. Co., 26 Court St., Brooklyn, $31,436; sidewalks adjacent to Victory Field, Forest Park, to O. B. Junior Contg. Co., 8625 137th St., Jamaica, $10,966. Noted May 14.

Okla., Tulsa—Bd. Comrs. Tulsa Co., 100 x 400 ft. grandstand, incl. grading, plumbing, wiring, to Tankersley Constr. Co., 510 Exchange Natl. Bank Bldg., $143,300. Est. $175,000. Noted May 14.

Ont., Toronto—Ross & MacDonald, archts., 465 Bay St., 282 x 350 ft., brick, stone, steel, concrete hockey arena, incl. parking space, stores, Church St., to Thomson Bros. Ltd., 56 Grenville St., for Maple Leaf Gardens Ltd., 13 King St. W. $989,297. Est. $1,250,000. Noted Feb. 16.

HEATING AND VENTILATING

PROPOSED WORK

Mass., Gardner—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, heating plant for hospital. $150,000. A. B. Franklin, Inc., 25 Haverhill St., Boston, engrs.

Mass., Grafton — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, renewing steam lines at State Hospital. $53,000 appropriated. Engineer not selected.

Mass., Medfield — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, new boilers at State Hospital. $40,000 appropriation granted. Engineer not selected.

Mass., North Grafton — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, new steam pipe lines at Grafton State Hospital. $53,000 appropriated.

Mass., Taunton—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, boiler room improvements at State Hospital. $45,000 appropriation granted. Engineer not selected.

Mass., Worcester — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, preliminary plans increasing heating facilities, replacing, at state institution. $25,000. Albert B. Franklin Co., Inc., 25 Haverhill St., Boston, engrs.

BIDS ASKED

N. J., Holmdel—June 10, by Dpt. Institutions & Agencies, State Office Bldg., Trenton, furnishing, installing steam lines, tunnel piping at Doctors Cottage, at New Jersey State Hospital. $25,000. Div. Architecture & Constr., State Office Bldg., Trenton, engrs.

Pa., Retreat—June 5, by Bd. Directors Central Poor Dist. Luzerne Co., 54 West Union St., Wilkes-Barre, service tunnels, excavation at new hospital. To exceed $25,000. A. L. Reilly, 58-59 Bennett Bldg., Wilkes-Barre, archt.

Heating and Ventilating (Continued)

CONTRACTS AWARDED

Ariz., Tucson—University of Arizona, concrete pipe conduit for carrying pipes for heating power, light and water and road improvements on University Campus, to Clinton Campbell, 90 West Moreland St., Phoenix, $49,275.

N. J., Helmetta — Bd. Educ., heating and ventilating in school, to Jensen & Rodner, Fords, $25,000. Noted May 7.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, plumbing in Brooklyn Technical High School, to E. B. McGovern, 251 East 66th St., New York, $224,500; heating, to D. J. Rice, Inc., 41-50 38th St., Long Island City, $527,300; electrical work, to Fischbach & Moore, 226 East 41st St., New York, $358,000; fixtures, to Simes & Co., Inc., 22 West 15th St., New York, $44,254. Grand total $1,154,-054. Noted Apr. 9.

N. Y., Pine Aire Station—Comrs. Dpt. Mental Hygiene, State Office Bldg., Albany, heating for Pilgrim State Hospital, to J. E. Brown, 868 Coney Island Ave., Brooklyn, $124,920. Noted Feb. 26 under "Hospitals."

UNCLASSIFIED

PROPOSED WORK

Calif., San Francisco—PIER EXTENSION—California State Bd. Harbor Comrs., Ferry Bldg., extensions to Piers 42 and 44. To exceed $150,-000. F. G. White, Ferry Bldg., engr.

La., Colfax—ASPHALT PLANT—Tee Juana Asphalt Co., Inc., P. Sippel, pres., 1 story, 66 x 130 ft., concrete, sheet metal. $50,000 incl. machinery.

Kansas—OIL PIPE LINE—Corporation, c/o Vickers Petroleum Co., Tulsa, Okla., J. A. Vickers, Pres., oil pipe line from Wichita to Rice Co. Line. $1,500,000. **Maturity indefinite.**

Mass., Fairhaven — COMFORT STATION — Town, Bd. Park Comrs., 1 story, probably concrete, Cushman Park. $25,000. Engineer not selected.

Mass., New Bedford—COAL HANDLING PLANT—Holmes Coal Co., Inc., Pine St., coal handling plant, incl. hoisting tower, power house. $25,000 or more. Private plans.

Mass., Revere—OIL STORAGE PLANT—Boston Port Development Co., 1 Court St., Boston, oil storage plant, Chelsea Creek. To exceed $25,000. Private plans.

N. J., Sea Girt—BOARDWALK—Boro 3,000 ft. boardwalk, 16 ft. wide. $40,000.

Pa., Johnstown—RETAINING WALL—City Council plans 500 ft. cantilever type rein.-con. retaining wall, 24 ft. high, rear of high school. $25,000. Gray & Chaffin, 607 Swank Bldg., engrs.

R. I., Providence—MAUSOLEUM—M. J. Perry, 52 Power St., plans by E. Swartout, 10 East 40th St., New York, mausoleum, Swan Point Cemetery. To exceed $40,000.

BIDS ASKED

D. C., Wash.—SHEDS—June 5, by District Comrs., sheds and facilities at eastern and western markets.

Conn., New Haven—COMFORT STATIONS—Yale Athletic Assn., Yale University, taking bids eight 1 story, 25 x 70 ft. comfort stations at Yale Bowl. $25,000 or more. G. Hadden, 607 5th Ave., New York, engr.

Ill., Taylorville—CULVERTS—See "Streets and Roads."

N. H., Concord—TUNNEL—June 12, by State W. A. Stone, purch. agt., Concord, concrete underground tunnel, covered passageway, connecting Tobey Building with Walker Building. C. R. Whitcher, 814 Elm St., Manchester, archt.

CONTRACTS AWARDED

California—GAS PIPE LINE—Southern Fuel Co., Garland Bldg., Los Angeles, Sect. 2, 31.5 mi., steel pipe line from San Fernando to Castaic, and Sect. 4, 108 mi. line from Grapevine to Kettleman Hills, to Macco Constr. Co., Haynes St., Los Angeles, and Robertson & Co., 800 East 61st St., Los Angeles Sect. 3, 40¼ mi. from Castaic to Grapevine, to Lang Transportation Co., 5501 Santa Fe St., Los Angeles, and Southern California Constr. Co., 111 Mesnager St., Los Angeles. Est. $800,000. Noted Apr. 16.

Montana — PIPE LINE — Montana Power Co., F. M. Kerr, genl. mgr. and vice pres., Butte, 230 mi. 20 in. welded pipe line, incl. excavating 5 ft. ditch, etc., to Winston Bros. Co., 1464 Northwest Bank Bldg., Minneapolis, Minn., pipe and welding, to A. O. Smith Co., 27th and Keefe Sts., Milwaukee, Wis. Est. $12,000,000. Noted Mar. 19, under "Contracts Awarded."

Pennsylvania—GASOLINE PIPE LINE—Atlantic Refining Co., 291 Bway., New York, 9,000 tons 6¾-in. pipe for gasoline pipe line from Pt. Breeze Refinery to New York state line, to Natl. Tube Co., 71 Bway., New York.

MATERIALS

BIDS ASKED

STEEL I-BEAMS—**Creston, Ia.**—June 9, at office Auditor Union Co., 36,000 lb. steel I-beams in various sizes, lengths, punched for diaphrams and complete with nailer clips.

STEAM CINDERS—**Brooklyn, N. Y.**—June 10, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, 15,000 cu.yd. steam cinders.

CEMENT, etc.—**New York, N. Y.**—June 10, by S. Levy, pres. Manhattan Boro, Municipal Bldg., 25,000 bags portland cement, installing 1 rotary sand dryer at Municipal asphalt plant, 90th St. and East River.

CONCRETE, TAR, OIL, etc.—**Pittsburgh, Pa.**—June 9, by R. G. Woodside, controller Allegheny Co., asphalt emulsion $300,000; cold mix aspahltic concrete $4,000; asphalt cement $2,100; crushed stone $22,500; crushed stone, Class B $70,000; crushed slag for asphalt plant $75,000; 4 kinds tar $68,000; asphalt concrete sand $67,000; river sand for asphalt sand $28,-000; river sand, general $2,000; mineral filler $9,000; Portland cement $5,000; concrete curbing, "B" $2,500; concrete curbing, assorted $12,500; rein.-con. pipe $5,000; vitr. sewer pipe $1,000; fuel oil $40,000; fittings for wood post barriers $7,500; wire rope $15,000; black locust posts $8,000; bituminous coal $4,300; tarpaulins $70; overhead doors $600; concrete mixers $1,500.

LEAD, VARNISH, etc. — **Pittsburgh, Pa.** — June 9, by R. G. Woodside, controller Allegheny Co., 40,000 lb. white lead, also linseed oil and turpentine in barrel lots, 300 gal. varnish, drilling 18 wells in 150 to 20 ft. deep in North and South Parks, reddog, per ton, for 1 year.

CONTRACTS AWARDED

RELAY RAILS, TIES, MESH WIRE FENCING — **California** — See "Railways."

CREOSOTED LUMBER—**Long Beach, Calif.**—City Harbor Dpt., 135,000 ft. 2 x 12 in. creosoted Douglas fir, rough creosoted lumber, f.o.b. Municipal Pier, to Consolidated Lumber Co., 122 West Jefferson St., Los Angeles, $6,503. Noted May 21.

FITTINGS, PIPE, etc.—**Santa Barbara, Calif.**—City Council, 1,136 ft. 8 in., 2,654 ft. 10 in., 1,168 ft. 14 in. Class B sand, Cast B and S water pipe with fittings, to Amer. Cast Iron Pipe Co., 412 West 6th St., Los Angeles, $14,007.

PIPE—**Spirit Lake, Ia.**—Bd. Comrs. Dickinson Co., 3,000 ft. 15- to 30-in. Corrugated metal or concrete pipe, 1 car load 3 x 1 in. x 16 ft. standard sawn bridge plank, to Sibley Cement Co., Sibley, and Wheeling Corrugated Co., 100 Southwest 2nd St., Des Moines, $1,200 and $1,300 respectively.

STEEL PIPE—**Detroit, Mich.**—City, Dpt. Water Supply, 735 Randolph St., 37,520 ft. 12-in. Class 250 Sand Spun B & S pipe 16 ft. 6 in. lengths f.o.b. cars Detroit, to R. D. Wood Co., 400 Chestnut St., Phila., Pa., at $1.239 per ft.; 5,280 ft. 12-in. B & S DeLavaud centrifugally cast pipe, Class 250, 12 ft. lengths, to U. S. Pipe & Fdry. Co., Burlington, N. J., $1.53 per ft.

ROAD OIL—**Austin, Minn.**—C. M. Hubbard, aud. Mower Co., 400,000 gal. road oil, to Standard Oil Co. of Indiana, 1300 Harmon Pl., Minneapolis. Noted Apr. 30.

STEAM CINDERS, etc.—**New York, N. Y.**—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., 10,000 bags cement, to J. A. McCarthy, 479 Walton Ave., $4,225; 4,000 cu.yd. sand, to W. J. McCormick Sand Co., Inc., East River and 18th St., $9,000; 30,000 cu.yd. steam cinders, to Empire Cinders Delivery Co., 12th Ave. and 48th St., $25,200. Grand total $33,625. Noted May 14.

EQUIPMENT

BIDS ASKED

ELECTRIC FAN—**Miami, Ariz.**—Miami Copper Co., 100 hp. electric fan, 80,000 cu.ft. air capacity per min. F. W. Maclennan, mgr.

MOTORS—**New Orleans, La.**—July 15, by Sewerage & Water Bd. of New Orleans, at office Purchasing Agent, 526 Carondelet St., two 450 and two 250 hp. vertical synchronous motors at Stations 6 and 7. B. Vallas, genl. supt.

FLEXIBLE SHAFT — **Roxbury, Mass.** — A. J. L., 2 Cleveland St., in market flexible shaft and motor sanding, die sinkers, buffing outfit.

DISTRIBUTING TRANSFORMERS — **Cleveland, O.**—June 12, by City, distributing transformers.

WHEEL TRAILERS, etc.—**Cleveland, O.**—June 5, by City, 1 or more 2 wheel trailers, 1 excavator crane.

CONTRACTS AWARDED

PUMPS—**Moscow, Idaho**—City Council, one each 600 and 1,200 gal. electrically driven pumps, to Byron Jackson Co., Spokane, Wash., $5,940. Noted Feb. 12.

FOREIGN

Australia, Melbourne—July 7, by Director Posts & Telegraph Dpts., 20 accumulator batteries with various voltage capacity 60 to 1680 amperes.

Italy, Venice — Distillazione Italiana Combustibiles, general contract process petroleum refining equipment, to A. G. McKee Co., 2422 Euclid Ave., Cleveland, O.

Mexico, Matamoras—City, c/o R. F. Garcia, taking bids water sediment separation tank, system of filters, chlorine, and slum purifier. $12,000.

Commercial Buildings

RESIDENTIAL

BIDS ASKED

Illinois—June 6, by National Autohaven Co., 201 North Wells St., Chicago, A. J. Williams, sixteen 3 story, 29 x 85 ft., and 1 story, 26 x 29 ft., face brick, stucco, timber hotel, incl. dining room, greasing-repair shop, gasoline station, plain found., in Peoria, Hoopestan, Pekin, Bloomington, Paxton, Canton, Champaign, Gilman, Springfield and other cities. Est. $65,000 each. Private plans.

Mass., Lynn—Hotel Lenox, V. M. Kavanaugh, pres., taking bids 3 story, 90 x 140 ft., brick, steel hotel, office, store, Exchange and Broad Sts. $150,000 or more. G. A. Cornet, 14 Central Ave., archt.

N. J., Arlington—See "Contracts Awarded."

N. J., Irvington (br. Newark)—D. Moscowitz, 1169 Springfield Ave., taking bids general contract 3 story, basement, brick, steel, Springfield Ave. $150,000. M. Kimmel, 214 Wainwright Ave., Newark, archt.

N. J., Palisades Park — See "Contracts Awarded."

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Hollis—See "Contracts Awarded."

N. Y., Jamaica—See "Contracts Awarded."

N. Y., Long Island City — See "Contracts Awarded."

N. Y., New York—June 22, by Port of New York Authority, 80-90 8th Ave., altering Apartment Houses 134, 138-150 Haven Ave., necessitated by construction of New York approach to George Washington Bridge over Hudson River; adv. E.N.-R. June 4.

N. Y., Queens Village — See "Contracts Awarded."

Tex., Alice—See "Contracts Awarded."

Wash., Seattle—One Thousand One Hundred Seven Seneca Corp., 1107 Seneca St., bids about June 22, general contract 20 story, basement apartment-hotel, 7th and Bell Sts. $1,000,000. T. C. Haire, c/o owner, archt.

CONTRACTS AWARDED

N. J., Arlington—M. Cassara, 40 Beach St., 3 story, basement, brick, steel, Beach St., separate contracts. $150,000. A. DePaola, 106 18th St., West New York, archt.

N. J., Palisades Park—Haubenstock Holding Co., 240 Broad Ave., 3 story, basement, brick, steel, Palisades Blvd. and 1st. St., separate contracts. $150,000. P. J. Jossier, 240 Broad Ave., archt.

N. Y., Brooklyn—Arescy Building Corp., M. Cafazzo, pres., 972 43rd St., apartment, private garage, 68th St. and 18th Ave., separate contracts. $150,000. A. Grambabro, 16 Court St., archt.

N. Y., Brooklyn—Corporation, c/o I. Mintzer, 1402 Avenue I, 6 story, 75 x 90 ft., Winthrop St. and East Flatbush Ave., to Minthron Constr. Co., 1402 Avenue I. Est. $150,000.

N. Y., Brooklyn—Corporation, c/o H. Sokolav, 1600 Kings Highway, 6 story, 84 x 160 ft., East 18th St. and Quentin Rd., separate contracts. $200,000. Cohn Bros., 215 Montague St., archts.

N. Y., Brooklyn—Corporation, c/o J. Perlbinder, 332 East 149th St., New York, 6 story, 130 x 160 ft., brick, steel, Ocean Ave. and St. Paul Court, separate contracts. $400,000. Franklin, Bates & Heindsmann, 2526 Webster Ave., archts.

N. Y., Brooklyn — Ensign Estates, Inc., S. Kitman, pres., 44 Court St., 6 story, 84 x 100 ft., East 31st St. and Snyder Ave., separate contracts. $175,000. I. Adelsohn, 44 Court St., archt.

N. Y., Brooklyn—H. Forin, 401 Schenectady Ave., 6 story, 109 x 123 ft., Union St. and Rochester Ave., separate contracts. $206,000. M. Hirsch, 350 Stone St., archt.

N. Y., Brooklyn—G. O. Building Corp., 1722 Church Ave., 6 story, 50 x 134 ft., Albermarle Rd. and East 21st St., separate contracts. $150,000. Franklin, Bates & Heindsmann, 2526 Webster Ave., New York, archts.

N. Y., Brooklyn—M. J. Goldberg, 1148 Boynton Ave., New York, 6 story, 90 x 90 ft., 22nd Ave. and 80th St., separate contracts. $250,-000. S. L. Malkind, 92 Court St., archt.

N. Y., Brooklyn—Kings Realty Corp., J. Feingold, secy., 1480 Dahill Rd., 6 story, basement, East 26th St. and Kings Hy., separate contracts. $300,000. Seelig & Finkelstein, 153 Pierrepont St., archt.

N. Y., Brooklyn—Kishner & Kishner, 274 Amherst St., 6 story, basement, brick, steel, Mayo St., separate contracts. $185,000. Seelig & Finkelstein, 153 Pierrepont St., archts.

N. Y., Brooklyn—Landboro Constr. Corp., A. R. Aquina, pres., 1316 84th St., 4 story, basement, 5th and Ovington Aves., separate contracts. $150,000. Burke & Olsen, 32 Court St., archts.

N. Y., Brooklyn—Natoma Development Corp., 1354 49th St., 6 story, 49th St. and 17th Ave., separate contracts. $150,000. W. E. Martin, 9265 4th Ave., archt.

N. Y., Brooklyn—Queensbrook Realty Co., D. B. Smith, pres., 26 Court St., 6 story, 91 x 100 ft., Shore Rd. and 97th St., separate contracts. $160,000. M. N. Weinstein, 93 Court St., archt.

N. Y., Brooklyn—Realty Industries, Inc., L. Schumer, pres., 190 Joralemon St., 4 story, 128 x 140 ft., 67th St. and 18th Ave., separate contracts. $196,000. J. J. Millman, 67 Court St., archt.

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Residential (Continued)

N. Y., Brooklyn — Seven Thousand Nine Hundred Twenty 19th Avenue Corp., H. Glaberson, pres., 2401 Avenue I, 6 story, 96 x 101 ft., 19th Ave. and 80th St., separate contracts, $175,000. Seelig & Finkelstein, 153 Pierrepont Ave., archts.

N. Y., Brooklyn — Shore Road Apartments, Inc., M. Berman, pres., 590 Utica Ave., 6 story, Shore Rd. and 72nd St., separate contracts, $235,000. M. Rothstein, 186 Joralemon St., archt.

N. Y., Brooklyn — Sylvan Heights Realty Corp., 387 Carroll St., 6 story, 80 x 112 ft., St. Johns Pl. and Classon Ave., separate contracts, $150,000. Seelig & Finkelstein, 153 Pierrepont Ave., archts.

N. Y., Brooklyn—United Builders, Inc., D. May, pres., 101 Lawrence St., 6 story, 71 x 195 ft., East 31st St. and Avenue I, separate contracts, $300,000. Malkind & Weinstein, 93 Court St., archts.

N. Y., Hollis Park—Jeannar Holding Corp., 1631 Jamaica Ave., Jamaica, 6 story, basement, 59 x 98 ft. apartment, 193rd St. and Hillside Ave., separate contracts, $150,000. G. Cram, c/o owner, archt.

N. Y., Jamaica — M. Boenig, 117 Sutphin Blvd., apartments, 144th St. and 120th Ave., separate contracts, $150,000. A. Allen, 163-18 Jamaica Ave., archt.

N. Y., Jamaica—Perfect Apartment Co., 16 Court St., Brooklyn, 6 story, 144 x 224 ft., 90th Ave. and 149th St., separate contracts, $500,000. B. Dorfman, 66 Court St., archt.

N. Y., Long Island City — Endee Building Corp., 41-44 44th St., 6 story, 84 x 95 ft., 44th St. and 43rd Ave., separate contracts, $170,000. A. Farber, 1746 Pitkin Ave., archt.

N. Y., New Rochelle—Center Gardens, Inc., 1460 Westchester Ave., New York, 5 story, Centre Ave. and Trinity Pl., to Rose Eng. Co., 1460 Westchester Ave., New York. Est. $350,000.

N. Y., Queens Village—Belmont Park Homes Co., 220th St. and Jamaica Ave., apartment, 225th St. and 103rd Ave., separate contracts, $220,000. W. VonFelde, 7538 Metropolitan Ave., archt.

Tex., Alice—Alice Hotel Co., c/o W. A. Sibley, 5 story, basement, 140 x 150 ft., brick, rein.-con., steel hotel, plain found., day labor, $150,000. S. W. Bliss, Harlingen, archt. Noted May 14.

CLUBS

PROPOSED WORK

Calif., Redwood City—See "Sports and Parks."

Mich., Detroit—Intercollegiate Alumni Club, E. P. LaJoie, chn., 1517 Dime Bank Bldg., plans by George D. Mason & Co., 409 Griswold St., 10 story, basement, 90 x 105 ft., brick, steel, rein.-con., stone, plain found., Washington Blvd. $1,400,000.

N. J., Asbury Park—Y. W. H. A., E. S. Klausner, pres., 730 Cookman Ave., 1 story, basement, brick, steel community centre, gymnasium, $150,000. **Maturity probably soon.** Architect not selected.

N. J., Bayonne—B. P. O. E., Bayonne Lodge, 39 West 34th St., sketches by C. I. Goldberg, 921 Bergen Ave., Jersey City, altering and constructing 2 story, basement, brick, steel club house addition, $150,000. Noted May 7.

N. J., Englewood—Englewood Women's Club, R. C. Gambee, chn., 162 Booth Ave., 2 story, basement, brick, steel, Lydecker St. $150,000. **Maturity about October.** Noted May 7.

N. J., Jersey City—Seventh Ward Democratic Club, J. Prout, pres., 119 Danforth Ave., will not build 3 story, basement, club house, 119 Danforth Ave. Project abandoned. Noted May 7.

N. J., Newark — Steuben Holding Co., 60 Park Pl., new sketches by F. H. Koenigsberger, 48 Walnut St., 2 story, basement, brick, steel club, market, Washington and Linden Sts. $150,000.

N. J., Orange—Women's Club of Orange, 556 William St., East Orange, 2 story, basement, brick, steel, 349 South Center St. $150,000. **Maturity indefinite.**

N. J., Ramsey—Fortitude Lodge, W. Shroeder, grand master, 2 story, basement, brick, steel masonic hall, Lake St. and Franklin Turnpike, $150,000. Project in abeyance. Noted May 7.

N. Y., New York — Peoples Equity Assn., c/o R. Clunenko, 342 Madison Ave., club, home for working and widowed mothers, $300,000. **Maturity spring 1932.** Noted Feb. 7, 1930.

Pa., Erie — Y. M. C. A., O. G. Hitchcock, pres., 31 West 10th St., plans by Meyers & Johnson, Commerce Bldg., 7 story, 50 x 100 ft., brick, steel club, also altering rear addition, incl. lobby, checkroom, kitchen, showers, sun baths and office, 31 West 10th St.

Pa., Sewickley Heights — Allegheny Country Club, W. C. Robinson, pres., c/o Natl. Electric Products Co., 1110 Fulton Bl., Pittsburgh, razing old club, erecting modern fireproof building, Watson Rd. $500,000. Architect not selected.

BIDS ASKED

Ia., Waterloo—June 10, by Y.W.C.A., c/o S. A. Cohagen, genl secy., 3 and 4 story, basement, 120 x 130 ft., rein.-con., brick, 18 West 4th St. $300,000. M. B. Cleveland, 424 East 4th St., archt. Noted Apr. 16.

N. H., Concord—June 11, by New Hampshire Odd Fellows, H. F. Davis, chn., building com., and J. E. Richardson, 56 Grove St., Dover, archt., Odd Fellows Home, 2 story, basement, 3 wings, brick, steel, plain found., Pleasant St. $150,000 or more. R. D. Kimball Co., 6 Beacon St., Boston, Mass., engrs. Noted Mar. 19.

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N. J., Clifton—Lee & Hewitt, archts., 152 Market St., Paterson, bids about June 15, general contract 2 story, basement, brick, steel home addition, Clifton Ave., for Clifton Lodge B. P. O. E., F. A. Latimer, exalted ruler, 725 Clifton Ave. $150,000. Noted Mar. 19.

N. J., Jersey City—June 8, by A. Dayis, archt., 140 Montgomery St., general contract 2 story, basement, 50 x 100 ft., brick, steel, Liberty St. and St. Paul Ave., for Polish American Democratic Club, 176 Pavonia Ave. $150,000. Noted May 28.

Pa., Johnstown—June 15, by J. C. Fulton & Son., archts., 2nd Natl. Bank Bldg., Uniontown, 3 story, basement, 109 x 125 ft., steel, stone rein.-con. club, Valley Pike and Linton St., for Masonic Temple Assn., R. G. Rose, 306 Vine St. $300,000. Noted May 7.

CONTRACTS AWARDED

Miss., Starkville—Ancient Free Masons, 2 story, brick club and theatre building, to Chastang Constr. Co., Jackson, $200,000.

HOSPITALS

PROPOSED WORK

Colo., Pueblo—State Bd. Corrections, c/o T. Duke, fireproof inmates home, nurses home and repairing old buildings. $230,000.

Conn., Hartford — City, W. E. Batterson, mayor, revised plans by Ebbets & Frid, 15 Lewis St., 6 story, brick, steel, stone hospital, Vine St. $600,000. W. H. Walsh, 612 North Michigan Ave., Chicago, Ill., engr. Noted Apr. 30.

Ia., Iowa City—Schmidt, Garden & Erickson, archts., 104 South Michigan Ave., Chicago, Ill., soon let contract 1 and 2 story, 121 x 126 ft. hospital addition, for Sisters of Mercy. $150,000.

Mass., Dorchester—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, sketches by Kendall, Taylor & Co., 209 Columbus Ave., Boston, reception building at Boston State Hospital. $500,000.

Mass., Monson — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, plans by C. P. Hoyt, 8 Beacon St., Boston, brick infirmary at Monson State Hospital, $150,000. A. B. Franklin, Inc., 25 Haverhill St., Boston, engrs. Noted May 7.

Mass., Waverly — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, sketches by C. P. Hoyt, 8 Beacon St., Boston, brick infirmary unit at Walter E. Fernald State School. $150,000.

Mich., Battle Creek — Battle Creek General Hospital Assn., G. J. Grenebach, Battle Creek, plans by Berlin & Swern, 228 North La Salle St., Chicago, Ill., 4 story, basement, brick, steel, concrete, plain found. To exceed $150,000. Noted Oct. 16.

Minn., Willmar—State, Comn. of Administration & Finance, 10 Capitol, St. Paul, plans by Long & Thorshov, 1028 Andrus Bldg., Minneapolis, two 2 story, basement, brick, stone, rein.-con. dormitories at State Asylum for Insane. $155,000.

N. J., Jersey City—Bd. City Comrs., Court House, 15 story, basement psychopathic hospital, Baldwin and Montgomery Sts. $150,000 or more, J. T. Rowland, Jr., 30 Journal Sq., archt. **Maturity about Sept., 1931.** Noted Apr. 9.

N. J., Plainfield—Columbus General Hospital, 1156 Park Ave., 4 story, basement, brick, steel, Park Ave. $150,000. **Maturity probably soon.**

N. J., Preakness—Bd. Freeholders Passaic Co., Court House, sketches by F. W. Wentworth, 140 Market St., Paterson, 2 story, basement, brick, steel preventorium, Valley View. $500,000.

N. J., Riverside—Morris & Erskine, archts., 1716 Cherry St., Phila., Pa., soon let contract 3 story, basement, 45 x 149 ft., brick, steel hospital addition, for Zarbrugg Memorial Hospital. $200,000.

N. Y., Neponsit Beach (mail Far Rockaway)—Dpt. Hospitals, Municipal Bldg., New York, bids in July, general contract hospital, at Neponsit Hospital. $300,000. Dodge & Morrison, 160 Pearl St., New York, archts. Noted Apr. 2.

N. J., Skillman—Dpt. Institutions & Agencies, State Office Bldg., Trenton, plans by Div. Architecture & Constr., State Office Bldg., Trenton, 2 story, basement children's building, brick, steel, New Jersey State Village for Epileptics. $160,000. **Maturity probably soon.**

N. Y., New York—Presbyterian Hospital Bway. and 165th St., Columbia University, Bway. and 116th St., and E. S. Harkness, 654 Madison Ave., sketches by James Gamble Rogers, 154 East 46th St., 12 story eye institute, at West 165th St. and Fort Washington Ave.

Tex., Dallas—Dallas Co., c/o C. E. Gross, and City, c/o J. N. Edy, mgr., county and city hospital improvements, at Parkland, Woodlawn and Convalescent Hospitals. $720,000. City's share $360,000 available. Election soon, $360,000, for county's share of cost.

BIDS ASKED

O., Cleveland—June 11 (extended date), 3 story, basement, brick, steel, concrete tuberculosis sanitorium addition, Warrensville Farm $250,000. H. Kregelius, City Hall, archt. Noted May 28.

CONTRACTS AWARDED

Mass., Boston—City, Hospital Dpt., 3 story, basement, brick, limestone, steel pediatric pavilion, children's building, concrete found., to John Bowen Co., Inc., 129 Newbury St., $550,000. Noted Mar. 26.

N. J., Verona—Bd. Freeholders Essex Co., Court House, Newark, general contract 2 story, basement, brick, steel staff house for physicians, at Essex Mountain Sanitorium, to Eastern Building Co., Inc., 270 Fabyan Pl., Newark, $157,000; plumbing, to Jaehnig & Peoples, Inc., 223 13th Ave., Newark, $16,350; heating, to J. H. Nelles Co., 835 Springfield Ave., Irvington, $20,988; electrical work, to Beach Electric Co., Inc., 81 Wallace St., Newark, $24,800. Grand total $219,138. Noted Apr. 2.

Ore., Pendleton — State, general contract hospital and garage at State Hospital for Insane, to Dougan-Hammond Constr. Co., 168 Thompson St., Portland, $125,800 and $14,700 respectively; tile, to Oregon Art Tile Co., 209 South Bway. $19,376; heating, to E. Ryedy, 264 Front St., $11,539; plumbing, to Urban Plumbing & Heating Co., 411 North 19th St. $8,644. Grand total, $180,056. Noted May 7.

CHURCHES

PROPOSED WORK

Kan., Wichita—First Presbyterian Congregation, c/o G. Edwards Newell, pastor, soon takes bids 3 story, 44 x 115 x 153 ft., rein.-con., Indiana limestone, chapel and educational building, incl. assembly hall, Elm and Lawrence Sts. $200,000. G. H. Thomas, 405 Wheeler-Kelly-Hagny Bldg., archt. Noted Feb. 5.

N. J., Asbury Park—First Church of Christ Scientist, 3rd Ave., sketches 1 story, basement, brick, steel addition, 3rd Ave. and Emory St. $150,000.

N. J., Jersey City—First United Presbyterian Church, W. B. Gold, pastor, 30 Tonnelle Ave., will no build 12 story, basement, brick, steel church, apartment, Sip and Tonnelle Aves. $500,000. Project abandoned. Noted Apr. 9.

N. J., Newark—Fanning & Shaw, archts., 49 Ward St., Paterson, soon let general contract 4 story, basement, brick, steel chancery building, 31 Mulberry St., for Roman Catholic Diocese, 22 Mulberry St. Est. $150,000. Noted May 21 Daily.

N. J., Newark — W. B. Willis, archt., 111 Madison Ave., New York, bids late in June, 2 story, basement, brick, steel, church, James and Washington Sts., for Second Presbyterian Church, 294 Mount Prospect Ave. $250,000. Noted May 21.

N. J., Passaic—St. Peters and Pauls Polish Natl. Church, J. Wroblewski, pastor, 126 River Dr., will not build church, Armory Park. $150,000. Project abandoned. Noted Apr. 9.

N. J., Paterson—Owner, c/o E. R. Coe, archt., 136 Washington St., sketches 2 story, basement, brick, steel church, $150,000.

N. J., Rutherford—Presbyterian Church, C. A. Ross, pastor, 80 Ridge Rd., will not build 2 story, basement, brick, steel, parish house, Ridge Rd. $150,000. Project abandoned. Noted May 21.

N. Y., New York—All Souls Unitarian Congregation, c/o M. Simons, pres., 183 East 80th St., soon lets contract church, Lexington Ave. and 80th St. $1,250,000. Bids in. Hobart Upjohn, Grand Central Terminal, archt.

O., Cleveland—B'Nai Jacob Kol Israel Congregation, D. Selinzki, rabbi, 3671 East 144th St., plans by M. Weis, Union Bldg., 2 story, basement, brick, steel, concrete church and social center building, East 147th St. and Kinsman Rd. $150,000.

Okla., Tulsa—Rabbi Hyman Iola, 207 East 27th St., Jewish Temple, soon lets contract part 1 and 2 story, 150 x 150 ft., concrete, plain found., 16th and Rockford Sts. $150,000. D. S. McCormick, Exchange Natl. Bank Bldg., archts.

Pa., Pittsburgh — East Liberty Presbyterian Church, 503 Highland Ave., C. A. Fisher, in charge Building Comn., 3 story, basement, granite, limestone, Gothic type architecture, incl. wrecking present church, Pennsylvania Ave., Baum Blvd., South Highland and South Whitfield Sts., $3,000,000. Cram & Ferguson, 248 Boylston St., Boston, Mass., archts. J. L. Stuart, 518 Oliver Bldg., super. engr. Soon takes bids wrecking present building. Noted May 8.

Que., St. Esprit—S. Barrette, parish priest, soon takes bids church. $250,000.

BIDS ASKED

N. J., Dunellen—First Methodist Church, bids about July 1 (from selected list of bidders), general contract 2 story, basement, brick, steel parish house, $200,000. Poggi & Bragdon, 215 Morris Ave., Elizabeth, archts. A. M. Korff, 203 Park Ave., Plainfield, assoc. archt. Noted Apr. 23.

N. J., Hawthorne — St. Anthony's Roman Catholic Church, W. E. Thompson, pastor, 286 Diamond Bridge Ave., taking new bids general contract 1 story, basement, 70 x 125 ft., brick, steel church, $160,000. T. J. Folks, 488 East 33rd St., Paterson, archt. Noted May 7.

N. J., Raritan—DePace & Juster, archts., 151 West 42nd St., New York, bids about June 15, general contract 1 story, basement, 50 x 105 ft., brick, steel, for St. Ann's Roman Catholic Church, $150,000. Noted May 28.

Ont., Toronto—June 5, H. J. Chown, archt., 20 Wayland Ave., 1 story, with 100 ft. tower, 65 x 120 ft., brick, stone, concrete church, stone and concrete founds., Kingston Rd., for St. Johns Roman Catholic Church, Kingston Rd. $150,000.

CONTRACTS AWARDED

Mass., Readville—St. John's Roman Catholic Church, D. R. Regan, pastor, altering and constructing 3 story, basement, convent addition, plain found., to Parker & Walsh, 22 Chapman St., Beverly. Est. $150,000. Noted May 21.

N. J., Hillside — Christ the King Roman Catholic Church, general contract 1 story, basement, brick, steel, to T. Reynolds Sons, 26 Sanford Terrace, Irvington. Est. $150,000.

Churches (Continued)

N. J., Paterson — St. Lukes Protestant Episcopal Church, A. Ketterson, pastor, 312 Getty Ave., general contract 1 story, basement, brick, steel church, to N. Van Daalen, 263 East 18th St. Est. $150,000. Noted June 12, 1930.

SCHOOLS

PROPOSED WORK

Ala., Tuskegee—Tuskegee Institute, 16 Cooper Sq., A. Taylor, in charge, soon lets contract engineering building. $300,000.

Ark., Monticello—Fourth Dist. Agricultural & Mechanical College, bids after June 1, 2 story, basement, concrete, brick, stone, steel additions to dormitory, library. $150,000. H. R. Burks, Wallace Bldg., Little Rock, archt.

Calif., Anaheim—Valencia University headed by U. G. Meyer, Spurgeon Bldg., Santa Ana, plans by F. H. Eley, 316 Otis Bldg., Santa Ana, fireproof university buildings. To exceed $150,000.

Calif., Los Angeles—City of Los Angeles School Dist. plans by G. M. Lindsey, Union Insurance Bldg., fireproof high school, Tracy and George Sts. $200,000.

Calif., San Diego—State of California, Sacramento, plans by W. H. Wheeler, 409 California Bank Bldg., rein.-con. gymnasium and 1,200 seating capacity basket ball court at State Teachers College. $152,000.

Del., Milford—Delaware School Foundation, Du Pont Bldg., Wilmington, 2 story, basement, brick, steel addition to grade and high school, plain found. $150,000. Project abandoned. Guilbert & Betelle, 20 Branford Pl., Newark, N. J., archts. Noted Apr. 31.

Del., Wilmington—Delaware School Foundation, Du Pont Bldg., Wilmington, plans by Guilbert & Betelle, 20 Branford Pl., Newark, N. J., School 25, 2 story, basement, brick, steel, rein.-con., plain found. $150,000.

Ga., Athens—University of Georgia, c/o C. M. Snelling, chancellor, sketches by Hentz, Adler & Shutze, 1330 Candler Bldg., Atlanta, Brown Memorial Dormitory Building, 3 story, brick, tile, concrete found. $150,000.

Ill., Springfield—Catholic Bishop of Springfield postponed until fall, 3 story boys' school, brick, stone. J. W. McCarthy & Co., 139 North Clark St., Chicago, archts. Noted Apr. 2.

Ind., Oldenburg—Franciscan Fathers Catholic Church, rejected bids general contract 2 story, basement, 60 x 135 ft., rein.-con., brick school. $150,000. Will readvertise. Werking & Son, Richmond, archts. Noted Apr. 2.

Mass., Fall River—Sacred Heart Roman Catholic Church, E. Carr, pastor, 163 Winter St., soon takes bids 3 story, basement, brick, steel school, plain found., Pine and Linden Sts. $200,000. Maginnis & Walsh, Statler Bldg., Boston, archts. Noted Apr. 16.

Mass., Framingham—City, J. G. Slattery, chn. P. Wks., soon takes bids altering and constructing 3 story, basement, brick, stone high school addition, plain found., Union Ave. G. F. Marlowe, 240 Boylston St., Boston, archt. $150,000. Noted Apr. 30.

Mass., Waltham—City, P. Duane, mayor, City Hall, sketches by McLaughlin & Burr, 88 Tremont St., Boston, altering and constructing 2 story, basement, brick, stone addition to Plympton School, plain found., Farnsworth St. $150,000.

Mass., Watertown—Rosary Academy, 130 Lexington St., soon takes bids altering and constructing 3 story, basement, 75 x 110 ft., brick, steel, boarding and day school addition, concrete found., Lexington St. $150,000 or more. E. T. Graham, 171 Newbury St., Boston, archt. Noted May 28.

Mass., Waverly — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, assembly building, employees dormitory, at State School. $230,000 appropriated. Architect not selected.

Mass., Winchester—St. Mary's Roman Catholic Church, N. J. Merritt, 158 Washington St., 2 story, brick school, Washington St. $150,000. Architect not selected.

Mich., Detroit—Detroit College of Law, Main Y. M. C. A. Bldg., bids in August, general contract 8 story, basement, 80 x 90 ft., brick, steel, rein.-con. law college addition, plain found., John R. and Elizabeth Sts. $400,000. Architectural Dpt. Y. M. C. A., 347 Madison Ave., New York, archts. Noted May 14.

Minn., Marshall—Bd. Educ., H. S. Simons, clk., plans by Croft & Boerner, 1004 Marquette Bldg., Minneapolis, 3 story, basement, brick, steel school, $200,000 voted. Noted June 12, 1930.

Minn., Minneapolis—Church of Holy Rosary, E. J. O'Toole, 2424 18th St., South Minneapolis, plans by Stebbins, Haxby & Bissell, 320 1111 Nicolett Ave., school, dormitory, 18th Ave. $150,000.

Miss., Okolona—Okolona Industrial School for Negroes, soon takes bids concrete, brick buildings, replacing structures recently destroyed by fire. $250,000.

Mont., Dillon—State of Montana, State Normal School, L. B. McMullen, pres., plans by McIver & Cohagen, Billings, 3 story, basement, 63 x 230 ft., rein.-con., stone, brick, at State Normal School. $190,000.

N. H., Bethlehem—Bethlehem School Dist., Town, soon takes bids 2 story, basement, 75 x 145 ft., brick, concrete high and grade school, plain found. $150,000. Haynes & Mason, 280 Main St., Fitchburg, Mass., archts. Noted Apr. 30.

N. H., Plymouth — State, E. L. Silver, Plymouth, sketches by C. R. Whitcher, 814 Elm St., Manchester, brick dormitories at State Normal School. $150,000.

N. J., Carlstadt — Bd. Educ. sketches by Hacker & Hacker, 201 Main St., Fort Lee, Grade and Junior High School, 2 story, basement, brick, steel, rein.-con., Lindbergh Field. $150,000.

N. J., Dover—Bd. Educ., High School, will not build 2 story, basement, brick, steel, State Hy. and McFarlan St. $150,000. Architect not selected. Project abandoned. Noted Feb. 5.

N. J., Hackensack—Bd. Educ., 355 State St., 2 story, basement, brick, steel, rein.-con., Union St. $150,000. Architect not selected.

N. J., Hackensack—Bd. Educ., 355 State St., 2 story, basement, brick, steel, rein.-con. school, 1st Ward. $150,000. **Maturity probably soon.** Architect not selected.

N. J., Hasbrouck Heights—Bd. Educ., B. C. Wilcox, Administration Bldg., Junior High School, 2 story, basement, brick, steel, rein.-con., westerly side athletic field. $224,000. **Maturity soon.** Architect not selected.

N. J., Hasbrouck Heights—Bd. Educ., B. C. Wilcox, pres., Administration Bldg., will not build Junior High School, 2 story, basement, Franklin and Ravine Aves. $224,000. E. Sibley, 1034 Edgewood Lane, Palisade, archt. Project abandoned. Noted May 28.

N. J., Jersey City—Guilbert & Betelle, archts., 20 Branford Pl., Newark, bids in July, 4 story, basement, brick, steel convent, rectory, educational and social center, Bay View and Bidwell Aves., for Sacred Heart Roman Catholic Church, M. J. Ropple, pastor, Bayonne and Jackson Aves. $500,000. Noted May 15.

N. J., Leonia—Bd. Educ. sketches by Hacker & Hacker, 201 Main St., Fort Lee, 3 story, basement, brick, steel, rein.-con., high school, Christie Heights. $566,000. Noted May 28.

N. J., Little Ferry—Bd. Educ., J. Cronin, pres., 2 story, brick, steel, rein.-con. school. $150,000. **Maturity indefinite.**

N. J., Maywood—Bd. Educ., Municipal Bldg., 2 story, basement, brick, steel, rein.-con. addition to School 1, Maywood Ave. $150,000. **Maturity probably soon.** Architect not selected.

N. J., Montclair—State Bd. Educ., State House Annex, Trenton, 3 story, brick, steel, rein.-con. school addition and auditorium, for Montclair State Normal School. $150,000. **Maturity indefinite.** Guilbert & Betelle, 20 Branford Pl., Newark, archts. Noted Apr. 23.

N. J., Mountainview — Bd. Educ., 2 story, basement, brick, steel school. $150,000. Project in abeyance. Hacker & Hacker, 201 Main St., Fort Lee, archts. Noted Apr. 9.

N. J., Mount Bethel — Bd. Educ., Warren Twp., will not build 2 story, basement, brick, steel, rein.-con. school. $150,000. Project abandoned. Noted May 7.

N. J., Newton—Bd. Educ., High School, will not build Junior High School, 2 story, basement. $150,000. Project abandoned. Hacker & Hacker, 201 Main St., Fort Lee, archts. Noted May 7.

N. J., River Edge—Bd. Educ., Boro Hall, 2 story, basement, brick, steel school. $150,000. **Maturity probably soon.** Architect not selected.

N. J., Rumson—Bd. Educ., B. H. Bordon, pres., 2 story, basement, brick, steel high school, Ward Ave. $150,000. **Maturity probably soon.** Architect not selected. Ridge Road School program abandoned. Noted Apr. 9.

N. J., Sea Bright—Bd. Educ., will not alter and construct school addition, River St. $150,000. Project abandoned. H. B. Seymour, 512 McClellan Ave., Long Branch, archt. Noted Jan. 23.

N. J., Summit—W. S. Bessell, archt., 420 Madison Ave., New York, will award contract about June 30, dormitory, for Kent Place School. $250,000. Bids in. Noted May 11 Daily.

N. Y., Brooklyn—St. Patricks Roman Catholic Church, J. J. Kent, pastor, 95th St. and 4th Ave., lets contract in June, altering 3 story school, 4th Ave. and 95th St. $150,000. McKenna & Irving, 15 Park Row, archts. Noted May 14.

N. Y., Brooklyn—Church of Our Lady of Angeles, T. E. Malloy, in charge, 367 Clermont Ave., plans by L. Friedman, 87-81 Merrick Blvd., Jamaica, 3 story school and 4 story rectory, 4th Ave. and 74th St. $150,000.

N. Y., Brooklyn—Roman Catholic Church of Good Shepard, 1952 Batchelder St., sketches by H. J. Gill, 415 Lexington Ave., 3 story, 62 x 100 ft., school, Brown St. and Avenue S. $150,000.

N. Y., College Point—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, School 129, 1st Ave. and 128th St. $460,000.

N. Y., Hollis — Bd. Educ., 500 Park Ave., sketches C. W. Martin, Flatbush Ave. extension and Concord St., Brooklyn, addition to P. S. 25, Plating and Prospect Aves. $200,000.

N. Y., Honeywood (sta. Staten Island)—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, addition to P. S. 8, Linwood and Gifford Aves. $300,000.

N. Y., Port Richmond—Bd. Educ., 500 Park Ave., New York, sketches by W. C. Martin, Flatbush Ave. extension and Concord St., addition to School 21, Hooker Pl. $350,000.

N. Y., St. George—Bd. Educ., 500 Park Ave., New York, sketches by C. W. Martin, Flatbush Ave. extension and Concord St., Brooklyn, Staten Island Vocational Continuation School, St. Marks Pl., Wall and Belmont Sts. $757,000—$1,000,000.

Pa., Meadville—Bd. Educ., R. X. Brown, secy. and mgr., High School Bldg., plans by W. G. Eckles & Sons Co., Lawrence Bldg., New Castle Grade School, 2 story, basement, brick, tile, incl. auditorium, 5th Ward. $150,000.

Pa., Springdale—Bd. Educ., B. D. Remley, secy., 511 Roslyn Ave., plans by J. H. Phillips, Wabash Bldg., Pittsburgh, High School, 2 story, part basement, brick, steel, incl. auditorium, gymnasium, on 2 acre site, Colfax St. near Ridge St. $150,000 voted. Noted Apr. 22.

R. I., North Kingstown—Town, superintendent Schools, sketches by William Walker & Son, 49 Weybosset St., Providence, 3 story, basement, brick, steel high school. $250,000.

R. I., Providence—City, P. Building Dpt., plans by T. J. H. Pierce, City Hall, 3 senior high schools. $450,000.

Vt., Bennington—Bennington College, R. D. Leigh, pres., plans by J. W. Ames and E. Dodge, 148 State St., Boston, Mass., college unit, probably stone. $150,000.

Wash., Seattle — University of Washington plans by ... raham, Dexter Horton Bldg., fine arts building, University Campus. $450,000.

Ont., Kingston—Queen University, plans by C. Drever, Brock St., 2 or 3 story, basement, brick, stone arts building. $250,000.

Ont., Toronto—China Mission College, A. McCrae, pastor, Kingston Rd., plans by J. M. Cowan, 981 Bay St., 4 story, basement, brick, steel, concrete addition, Kingston Rd. $150,000.

BIDS ASKED

Conn., Middletown—June 8, by Towner & Sellew Associates Inc., archts., 329 Main St., brick school, community building, for Town. $125,000-$150,000.

La., Baton Rouge—June 16, by Louisiana State University and Agriculture & Mechanical College, for Fine Arts Building, 3 story, basement, incl. recital hall, also 3 story, basement field house and recreation center. Weiss, Dreyfous & Seiferth, Maison Blanche Bldg., New Orleans, archts., Noted May 21.

La., Houma—Terrebonne Parish School Bd. bids about July 1, concrete, brick school, here, number frame buildings at other points. $150,000. W. T. Nolan, Canal Bank Bldg., New Orleans, archt. Noted May 7.

Mass., Falmouth—Town, A. L. Pattee, chn. School Bd., taking bids 2 story, basement, brick, stone, steel, plain found. $175,000. H. F. Kellogg, 378 Stuart St., Boston, archt. Noted May 28.

Mass., Hamilton—Town, J. Lamson, chn. Bd. Selectmen, taking bids 2 story, basement, 120 x 120 ft., brick steel, high school, incl. gymnasium, plain found. $165,000. C. G. Loring, 7 Water St., Boston, archt. Noted Apr. 30.

Mass., Lawrence—City, Mayor's Office, City Hall, taking bids 2 story, basement, brick, stone, steel school, plain found., Broadway. $150,000-$175,000. J. G. Morissette, 575A Essex St., archt. Noted May 7.

Mass., Lawrence—City, School Building Comn., bids about June 10, 2 story, basement, brick, stone, plain found., Pleasant and Woodland Sts. $150,000-$175,000. Higgins & Collins, Central Bldg., archts. Noted May 14.

Mass., South Hadley—June 10, by Town, A. Kjoller, School Bd., 2 story, basement, 35 x 45 ft., 60 x 115 ft., brick, artificial stone school, Carew St. $150,000. M. Maloney, 23 Pearl St., Springfield, archt. Noted May 28.

Mass., Weston—June 10, by Town, Superintendent Schools, 3 story, basement, brick, steel, stone, School St. $225,000. R. Harrington Doane, 60 Batterymarch St., Boston, archt. Noted Mar. 12.

N. J., Bergenfield—Bd. Educ., C. S. Decker, dist. clk., 45 Smith St., bids about July 1, 2 story, basement, brick, steel school adjoining Marion Field. $155,000. A. Dore, 173 Main St., Hackensack, archt. Noted May 28.

N. J., Bloomfield—June 15, by Bd. Educ., High School, 2 story, basement, brick, steel, rein.-con., Watchung and Broughton Aves. $300,000. Bartlett & Marsh, Lefcourt Bldg., Newark, archts. Noted May 14.

N. J., Irvington (br. Newark)—Bd. Educ., 1253 Clinton Ave., bids about June 15, general contract 2 story, basement, brick, steel addition, Grove St. $250,000. Schneider, Kleeman & Werther, 1007 Broad St., Newark, archts. Noted Apr. 9.

N. J., New Brunswick — June 15, by Bd. Educ., Junior High School, Livingston Ave., general contract altering and constructing 2 story, basement, brick, steel, rein.-con. addition to Senior High School, Livingston Ave. between Delevan and Comstock Sts. $250,000. A. Merchant, 1 Elm Ave., archt. Noted May 28.

N. J., Rahway—Bd. Educ., High School, bids about July 1, general contract Junior High School, 3 story, basement, brick, steel, rein.-con., plain found. Central Ave. near St. George Ave. $480,000. Seymour & Williams, 146 Irving St., Rahway, archts.

N. J., Rutherford—T. J. Folks, archt., 488 East 33rd St., Paterson, bids about July 1, general contract 2 story, basement, brick, steel, rein.-con., school, Ames Ave. and Chestnut St., for St. Marys Roman Catholic Church. $200,000.

N. J., Union—Bd. Educ. bids about June 15, general contract 2 story, basement, brick, steel, rein.-con., Oakland Ave. $300,000. F. A. Elsasser, 1000 Stuyvesant Ave., archt. Noted Apr. 30.

Pa., Souderton—June 6, by Bd. Educ., 2 story, basement, 145 x 160 ft., rein.-con., brick, steel high school, plain found. $300,000. C. M. Talley, Telferd, archt. Noted Feb. 5.

Tennessee—June 6, at office D. S. Hamilton, supt. schools for Grainger Co., Court House, Rutledge, 2 new high schools, incl. auditorium and gymnasium, one at Rutledge, other at Washburn. F. Fugate, ch. Grainger Co. Building Com.

CONTRACTS AWARDED

D. C., Wash.—District Comrs., District Bldg., domestic service building at Training School, to A. L. Goode, Inc., Charlotte, N. C., $115,900; repairing Francis Scott School, to Bahen & Wright, 916 Rhode Island Ave., $49,975. Noted Apr. 30.

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Schools (Continued)

Ill., Quincy—W. E. White, secy. Bd. Educ., Musselman Bldg., general contract, 3 story, basement, 224 x 310 ft., rein.-con., brick, stone, incl. gymnasium, swimming pool, machine shop, kitchen, 14th St. near Maine St., to Kaempen Co., Quincy, $1,198,858. Noted May 14.

Kan., Hugoton—Bd. Educ. for Consolidated Dist. 3, C. F. Shafer, dir., Rural High School, 2 story, basement, 116 x 176 ft. rein.-con., brick, Bedford stone, to A. Helwig, Hoisington, $111,430; heating, plumbing and ventilating, to Stevens Plumbing Co., Hutchinson, $23,372; electrical work, to R. A. Hall, Hutchinson, $3,743. Grand total $138,545.

Ky., Covington—Bd. Educ., 3 story, basement, 159 x 161 ft., rein.-con., brick school, plain found., to G. Lubrecht Co., Covington, $159,235.

Me., Augusta—St. Augustine's Roman Catholic Church, J. A. Casavant, pastor, altering and constructing 2 story, basement, brick school, plain found., to L. Malo & Sons, 15 East Ave., Lewiston. Est. $150,000 or more. Noted Apr. 2.

Mass., Boston — St. Ann's Roman Catholic Church, J. O'Donnell, pastor, 242 Neponset Ave., altering and constructing 2 story, basement, brick, stone, steel school addition, plain found., to Archideacon & Sullivan, Inc., 1742 Washington Ave., Boston. Est. $150,000.

Mass., Cambridge — Boston University, 688 Boylston St., Boston, 5 story, basement, concrete, steel dormitory, plain found., to D. Amore Constr. Co., 89 State St., Boston. Est. exceeds $150,000.

Mass., Hanover—School Building Comn., 2 story, basement, brick, stone, plain found., to R. E. Runnels Co., Chalifoux Bldg., Lowell. Est. $150,000. Noted May 21.

Mass., Nantucket—Town, Bd. Selectmen, 2 story, basement, 90 x 105 ft., brick school, plain found., to J. C. Ring, Nantucket. Est. $150,000. Noted Mar. 26.

Mass., Norwood—Town, W. L. Grant, supt. schools, Washington St., and W. G. Upham, archt., Bigelow Bldg., altering and constructing 2 story basement addition to Senior High School, plain found., to John Bowen Co., Inc., 129 Newbury St., Boston. Est. $150,000. Noted Apr. 30.

Mass., Norwood—St. Catherine's Roman Catholic Church, J. F. Doherty, pastor, Nahatan St., and McLachlin & Burr, archts., 88 Tremont St., Boston, altering and constructing brick, steel school addition, concrete found., to John Bowen Co., Inc., 129 Newbury St., Boston. Est. $150,000. Noted Mar. 5.

Mass., Quincy — City, H. M. Muir, supt. schools, and Harper & West, archts., 92 State St., Boston, altering and constructing 2 story basement, brick, steel addition to Junior High School, plain found., Hancock St., to M. S. Kelliher Co., 10 High St., Boston. Est. $150,000. Noted Mar. 12.

Mass. Raynham—Town, E. S. White, chn. building com., 1 and 2 story, basement, brick, steel schools, plain founds., to L. M. Witherell & Sons, 29 Court St., Taunton. Est. $150,000. Noted Apr. 30.

Mo., Columbia—University of Missouri, c/o Memorial Union Comn., R. L. Hill, secy., 3 story, 50 x 140 ft., rein.-con., brick, stone, on campus, to Simon Constr. Co., Columbia; excavating, to Boyd Constr. Co., Columbia; cut stone, to Indiana Limestone Co., Midland Bldg., Kansas City; structural steel, to Mississippi Valley Steel Co., 3117 Big Bend Blvd., Maplewood; reinforcing steel, to Concrete Eng. Co., Walsix Bldg., Kansas City. Noted Oct. 10, 1929.

N. J., Jamesburg—Bd. Educ., High School, general contract 2 story, basement, 85 x 185 ft., brick, steel, rein.-con. high school, Buckelew and Davison Aves., to J. N. Wester, 320 Amboy Ave., Metuchen; plumbing, to Milltown Eng. Co., Elkins Lane; heating and ventilating, to P. H. Slack Co., Trenton; electrical work, to Mercer Electric Co., 338 South Broad St., Trenton. Est. $150,000. Noted May 14.

N. Y., Hollis—Bd. Educ., 500 Park Ave., New York, general contract addition to P. S. 118, to Wilaka Constr. Co., 335 West 18th St., New York. $224,300. Noted Apr. 30.

N. J., Jamesburg—Bd. Educ., general contract 2 story high school, to J. N. Wester, Metuchen, $93,956; electrical work, to Mercer Electric Co., 338 South Broad St., Trenton, $5,122; heating, to P. S. Slack, 219 Perry St., Trenton, $12,832; plumbing, to Milltown Eng. Co., Milltown, $5,400. Grand total $117,318. Noted Mar. 26.

N. J., Westwood—St. Andrews Roman Catholic Church, J. P. Lenihan, pastor, Washington Ave., general contract 2 story, basement, 110 x 215 ft., brick, steel school, Washington Ave. and Irvington St., to Sullivan & Dolan Co., 125 Ellison St., Paterson, plumbing, to J. Boyd Plumbing & Heating Co., 310 Elm Pl., Leonia; heating and ventilating, to D. McGrath Co., 185 Moore St., Hackensack; electrical work, to T. F. Moore, 18 Washington St., Bloomfield. Est. $150,000. Noted May 21.

N. D., Dickinson—State Normal School Holding Co., M. Klinefelter, secy., general contract 3 story, basement, brick, rein.-con. dormitory, to Thorvaldson & Johnson, 26 Clifford Blk., Grand Forks, $88,245. Noted May 7.

Pa., McKeesport—Bd. Educ., J. B. Ritchey, pres., Ariel Bldg., pres., (a) general contract (b) heating (c) plumbing (d) electric wiring (1) 2 story, basement, 70 x 114 ft. school, 28th Ave. and Beale St., (2) 2 story, basement, 57 x 98 ft., Grandview Ave., both brick, hollow tile, to G. H. Chilli, 517 McClure Ave., Homestead, (a1) $71,160 (a2) $42,500; to John Graham Plumbing & Heating Co., 137 Bausman St., Pittsburgh, (b1) $12,770; to Iron City Plumbing Co., 527 1st Ave., Pittsburgh, (c1) $6,471 (c2) $4,268; to W. G. Hutton, 419 Ohio Ave., Glassport, (d1) $4,693; to Superior Pump & Sanitation Co., 24th and Sidney Sts., S. S. Pittsburgh, (b2) $9,074; to K. K. Wood, 1610 Maple Ave., Turtle Creek, (d2) $2,112. Grand total $153,048. Noted Apr. 30.

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THEATRES

PROPOSED WORK

N. J., Perth Amboy—Norkin Co., c/o Warner Bros. Pictures, Inc., 321 West 44th St., New York, 2 story, basement, brick, steel theatre, store, Smith and Maple Sts. $150,000 or more. J. Eberson, 370 Lexington Ave., New York, archts. Project in abeyance. Noted Mar. 12.

N. Y., New York—Corp., c/o Bethlehem Eng. Corp., 1560 Bway., theatre, 3,000 seating capacity, 8th Ave. and 42nd St. To exceed $700,000. **Maturity later.**

BIDS ASKED

Tenn., Nashville—June 15, by Warner Bros. Pictures, Inc., 321 West 44th St., New York, general contract, 2nd basement for garage, two store space, 12 story, basement, black polished granite, white limestone, 2,500 seating capacity theatre, 70 ft. Marquise, Church St. and 6th Ave. N. Est. $1,250,000. Marr & Holman, Stahlman Bldg., archts. Structural steel contract awarded to Nashville Bridge Co., foot of Shelby St., erecting 4,000,000 lb. steel, to R. H. Goodrich Co., Nashville; rein.-con. found., to Sumner Constr. Co., Sumner Bldg., total $200,000. Noted Jan. 1.

CONTRACTS AWARDED

Calif., Pomona—Uptown Theatre Co., rein.-con., 1,000 seating capacity, Carey Ave., to J. Strona, Philadelphia St., $165,000.

Calif., Richmond—United Artists of California, 1966 South Vermont St., rein.-con. theatre, 1,200 seating capacity, to H. I. Beller Constr. Co., 6513 Hollywood Blvd., Los Angeles, $150,000. Noted May 28.

BANKS

PROPOSED WORK

N. J., Paterson — H. B. Crosby & A. E. Sleight, archts., 125 Ellison St., revising plans and soon takes bids 2 story, basement, 80 x 100 ft., brick, steel, stone bank, Bway. and West Bway., for Bway. Bank & Trust Co., 210 Bway. Est. $150,000. Noted Apr. 16.

BIDS ASKED

N. J., Paterson—H. B. Crosby & A. E. Sleight, archts., 125 Ellison St., taking bids general contract 2 story, basement, 80 x 85 ft., brick, steel, rein.-con., Bway. and West Bway., for Bway. Bank & Trust Co., 120 Bway. $150,000. Noted May 7.

CONTRACTS AWARDED

N. Y., Brooklyn—Fulton Savings Bank, 375 Fulton St., general contract bank, to William Kennedy Constr. Co., 215 Montague St. Est. $165,000. Noted May 14.

OFFICES

PROPOSED WORK

Calif., Los Angeles—M. J. Connell, Connell Bldg., plans by J. T. Payne, 321 West 23rd St., 13 story, basement, 150 x 281 ft., office, store, loft, 7th and Los Angeles Sts. $1,750,000.

Mass., Boston—Judge Baker Foundation, W. Healy, 40 Court St., sketches by Derby, Barnes & Champney, 3 Joy St., 4 story, basement, brick, steel, plain found., Beacon and Walnut Sts. $150,000 or more.

Mass., Cambridge—See "Stores."

N. J., Hackensack—F. Buono, 95 Main St., will not build 2 story, basement office, store, Prospect and Essex Sts. $150,000. Project abandoned. Noted Apr. 23.

N. Y., Albany—See "Warehouse."

N. Y., New York — Thompson-Starrett Co., 250 Park Ave., bids in July, on excavation, steel, and other sub-contracts 48 story office, 30-40 Broad St., for Continental Realty Corp., F. M. Hornby, pres., 25 Broad St. $4,500,000. Noted May 14, under "Contracts Awarded."

O., Euclid (br. Cleveland) — Addressograph-Multigraph Co., 1814 East 40th St., Cleveland, sketches executive office and sales department building. To exceed $150,000.

BIDS ASKED

Mich., Grand Rapids—J. and G. Daverman & C. Steketee, archts., Grand Rapids, bids about June 15, 7 story, basement, 40 x 85 ft., brick, rein.-con., steel office, plain found., Division Ave., for Hammerslag & Tinkham, Division Ave. Building to be occupied largely by Western Union Telegraph Co. Noted Apr. 30.

CONTRACTS AWARDED

Conn., Hartford — Hartford Fire Insurance Co., 690 Asylum St., R. M. Bissell, pres., brick, steel office, to Allyn Wadhams Co., 15 Lewis St. Est. $150,000. Noted May 7.

Mass., Boston—F. L. Putnam & Co., 113 State St., reconstructing 6 story, basement, brick, stone, steel office, plain found., 159 Devonshire St., to G. B. H. Macomber Co., 38 Chauncy St. Est. $150,000.

N. J., Fort Lee—General Manager Port of New York Authority, 80-90 8th Ave., New York, general contract field office for Hudson River Bridge, to B. Vezzetti, 706 Grand St., Hoboken, $107,000; heating, to A. I. Green, 33 Old Bway., New York, $12,544; plumbing, to John Boyd Plumbing & Heating Co., 100 West 72nd St., New York, $5,975; electrical work, to Hoffman & Elias, 921 Bergen Ave., Jersey City, $3,750. Grand total $189,269. Noted Apr. 23.

Que., Montreal—J. O. Gravel, 59 x 110 ft. rein.-con., brick, steel office, St. Catherine St., to Dansereau Ltd., 1387 Bernard St. W. $228,000.

STORES

PROPOSED WORK

Mass., Cambridge—B. M. Graves, 1 Fuller Pl., sketches by E. S. Read and C. Everett, 177 State St., Boston, store, office, Brattle and Story Sts. $150,000 or more.

N. J., East Orange—Owner, c/o E. C. Epple, archt., 17 Washington St., sketches 2 story, basement, brick, steel store, office, apartment, Dodd and Prospect Sts. $150,000.

N. J., Paterson — R. Cannizzaro & A. Ferrencielo, 75 Cross St., plans by J. Bellomo, 6 Park Ave., 2 story, basement, brick, steel store, apartment, Mill and Grand Sts. $150,000. Noted May 21.

N. Y., Brooklyn — Wilna Realty Corp., L. Posner, secy., 16 Court St., plans by Cohn Bros., 215 Montague St., 156 x 208 ft. store, apartment, Ocean Parkway from Webster to Newkirk Aves. $400,000.

N. Y., Jamaica—Elizabeth Naudas, 84-13 110 St. 5 story, 51 x 125 ft. store, showroom, Jamaica Ave. and New York Blvd. $150,000.

BIDS ASKED

Ind., Hammond—J. R. Gordon taking bids 2 story, basement, 60 x 140 ft., stone, steel, incl. office, State and Holman Sts. $150,000. Lowenberg & Lowenberg, 11 West Monroe St., Chicago, Ill., archts.

N. J., Kearny (sta. Arlington)—L. Kasoff, archt., 164 Market St., Newark, taking bids general contract altering and constructing 4 story, basement, brick, steel store, apartment addition, Midland Ave., for Avon Building & Loan Asso., 159 Midland Ave. $150,000.

N. J., Paterson—J. Bellomo, archt., 6 Park Ave., Paterson, bids about June 5, general contract 2 story, basement, brick, steel store, office, storage and comfort station, Island Market Section, for Island Market Corp., P. Alfano, in charge, 7 Bank St. $150,000. Noted May 14.

N. Y., Brooklyn—See "Contracts Awarded."

CONTRACTS AWARDED

N. Y., Brooklyn — I. F. Realty Corp., I. Funt, pres., 2330 65th St., 6 story, basement store, apartment, 65th St. and Avenue O, separate contracts. $750,000. B. Jalkow, 375 Fulton St., archt. Noted May 14.

PUBLIC

PROPOSED WORK

Ark., Monticello — COURT HOUSE — Bd. Comrs. Drew Co., W. E. Spencer, judge, plans by R. Burks, Wallace Bldg., Little Rock, 2 story, basement, concrete, brick, stone. $150,000.

Calif., Beverly Hills—CITY HALL and FIRE-HOUSE—City Council plans by Koernor & Gage, 468 North Camden Dr., 3 story, basement, 8 story tower, rein.-con. city hall, $400,000; 1 story, rein.-con., brick fire station, $50,000.

Calif., San Jose — COURT HOUSE — Santa Clara Co. sketches rebuilding courthouse, recently destroyed by fire. $250,000 or more.

Conn., Litchfield — JAIL — Litchfield Co. Comn., J. H. Lancaster, secy., postponed construction jail, $200,000 appropriation rescinded. P. Sunderland, 248 Main St., Danbury, archt. Noted May 28.

Mass., Attleboro—CITY HALL—City, Mayor's Office, plans by Higgins & Johnston, 24 Park St., 2 story, basement, brick stone, plain found., North Main St. To exceed $150,000. Noted Mar. 20, 1930.

Mass., Boston—OFFICE—Commonwealth of Massachusetts, Dpt. P. Wks., sketches by Adden, Parker, Clinch & Crimp, 177 State St., 8 story, basement, brick, steel, Nashua St. $100,000,000.

Mass., Chelsea—SOLDIERS HOME—Commonwealth of Massachusetts, Administration Comn., Room 308, State House, Boston, brick, steel. $300,000. Architect not selected.

Mich., Caro — COURT HOUSE — Tuscola County Building Comn., C. Keinath, chn., receiving competitive sketches 3 or 4 story court house. $150,000.

Mich., Jackson—PRISON—State, Prison Bd., sketches by K. A. Johnson, dir. constr., Jackson, additional brick, steel, rein.-con. prison buildings, State Prison Grounds. $800,000.

Mo., Clayton—COURT HOUSE and JAIL—St. Louis Co., c/o County Court, circulating petitions for $1,500,000 bond issue election for court house and jail.

Neb., Lincoln — MUNICIPAL — City, T. H. Berg, clk. voted special tax levy of $25,000, annually for 10 years for municipal building, 10th and Q Sts.; and fire station and street department building. Total $250,000.

Public (Continued)

N. H., Stewartstown—ALMSHOUSE—Coos Co., W. W. James; Hodfdon Bldg., Berlin, plans by C. R. Whitcher, 814 Elm St., Manchester, almshouse. $200,000.

N. J., Maplewood—MUNICIPAL—Township Com., Municipal Bldg., sketches by Guilbert & Betelle, 20 Branford St., Newark, 2 story, basement, brick, steel, rein.-con. $275,000. State ordinance passed.

N. J., Newark — FIRE HOUSE — Bd. City Comrs., City Hall, general contract, 3 story, basement, 75 x 75 ft., brick, steel, 18th Ave. and Norwood St. $150,000. Bids in. Project in abeyance. F. Grad, 1023 Broad St., Newark, archt. Noted May 14.

N. Y., Brooklyn—MUSEUM—Brooklyn Institute of Arts & Sciences, E. C. Blum, in charge, 45 Plaza St., bids in July or later, altering museum, Eastern Parkway and Washington Ave. $265,000. McKim, Mead & White, 101 Park Ave., New York, archts. Noted Apr. 16.

N. Y., Elmhurst—COURT HOUSE—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., court house. $225,000. **Maturity late in fall.** Architect not selected.

N. Y., Ridgewood—COURT HOUSE—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., Court house. $400,000. **Maturity late in fall.**

N. Y., Jamaica—ARMORY—Armory Bd., Municipal Bldg., New York, bids after Aug. 1, general contract 2 and 4 story, 166 x 586 ft. armory, 93rd Ave. and 168th St. $1,750,000. C. B. Meyers, 31 Union Sq., New York, archt. Noted Jan. 8.

N. Y., Kingston—ARMORY—Adjutant General, Capitol, Albany, May 29, general contract new armory, from C. M. McLean & Sons, 332 Water St., Binghamton, $229,400; heating, from E. W. Tompkins, Auburn, $19,629; sanitary work, from Bareham & McFarland, 366 Main St., Rochester, $14,342; electrical work, from Stearns Electric Co., 108 Hamilton Ave., Albany, $436. Noted May 7.

N. Y., Newburgh—ARMORY—Adjutant General, Div. Military & Naval Affairs, Capitol, Albany, May 29, general contract armory, from Miller & Gaynor Co., 1 Clinton St., Poughkeepsie, $239,500; heating, from J. W. Danforth Co., 70 Ellicott Sq., Buffalo, $18,804; sanitary work, from L. F. Bannon, 14 Andrew St., Kingston, $15,589; electrical work, from Central Electric Co., 372 Warren St., Hudson, $8,478. Noted May 7.

N. Y., New York—HEALTH OFFICE—S. Levy, pres. Manhattan Boro, Municipal Bldg., bids late in June, general contract Health Building, 11 story, Worth, Center, Leonard and Lafayette Sts. $4,720,000. C. B. Meyers, 31 Union Sq., archt. Noted Jan. 8.

N. Y., New York—ART MUSEUM—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, bids late in June or early in July, art museum, Metropolitan Museum of Art, 5th Ave., 80th to 84th Sts. $3,350,000. J. R. Pope, 542 5th Ave., archt. E. E. Seeley, 101 Park Ave., structural engr. Tenny & Ohmes, 101 Park Ave., mechanical engrs. Noted May 7.

Pa., Phila.—COUNTY—Bd. Comrs., Philadelphia Co., G. F. Holmes, pres., City Hall, plans by J. T. Windrim, 1201 Chestnut St., county building, Parkway and Vine St. $3,000,000.

R. I., Cranston (mail Providence)—MEN'S REFORMATORY—State, Dpt. P. Welfare, State House, Providence, 3 story, basement, brick, steel, plain found., off Pontiac Ave. $500,000. C. E. Blars, Box 7, Howard, engr. Noted Mar. 5.

Tex., Port Arthur—SUB-COURT HOUSE—Jefferson Co., c/o Comrs., Beaumont, sub-court house. $150,000 election soon for same.

Pa., Holmesburg—CELL HOUSE—Dpt. P. Welfare, J. F. Dugan, dir., City Hall Annex, soon lets contract 2 story, basement, 62 x 430 ft. rein.-con., steel, plain found., also 1 story, 46 x 68 ft. additional shop building. P. H. Johnson, Architects Bldg., Phila., archt.

BIDS ASKED

Mass., Brighton (br. Boston)—LIBRARY—June 16, by City of Boston, Library Dpt., F. W. Buxton, chn. Bd. Trustees, Copley Sq., Boston, 2 story, basement, brick, limestone, steel branch library, plain found., Faneuil and Bigelow Sts., $200,000. Kilham, Hopkins & Greeley, 9 Park St., Boston, archts. Noted Mar. 19.

Mass., Jamaica Plain (sta. Boston) — LIBRARY — June 18, by City of Boston, Library Dpt., Copley Sq., 1 story, basement, brick, stone, plain found., 433 Centre St. $150,000. Maginnis & Walsh, Statler Bldg., Boston, archts. Noted May 21.

Mass., Worcester—AUDITORIUM—June 30 (extended date), by City, Worcester Memorial Auditorium Superintendent Public Buildings, brick, stone, steel memorial municipal auditorium, Salisbury St. $2,000,000. L. W. Briggs & Co., 314 Main St., archts. F. C. Hirons, 40 East 49th St., New York, engr. Noted May 28.

N. Y., Walkill—PRISON—June 17 (extended date), by Comrs. Correction, State Office Bldg., Albanay, medium security prison; adv. E. N.-R. June 4. Noted May 7.

Pa., Franklin—COURT HOUSE—June 18, by Bd. Comrs. Venango Co., Z Smiley, clk., 4 story, 50 x 80 ft. brick, stone, sandstone, steel, concrete, Elk St. $150,000. W. H. Crosby, Beers Bldg., Oil City, archt. Noted Mar. 19.

CONTRACTS AWARDED

Mass., Boston—PUBLIC WELFARE—Overseers Pub. Welfare, 43 Hawkins St., 3 story, basement, brick, steel, concrete, plain found., to Frank Imhoff Co., 164 Dudley St., Roxbury, $155,000. Noted May 14.

Mass., Sudbury—TOWN HALL—Town, H. A. Fairbanks, chn. com., 2 story, basement, brick, steel, concrete found., to Perkins & Wells Co., Inc., 46 Hubbard St., Concord. Est. $150,000. Noted Apr. 30.

Okla., Tulsa—JAIL—City Council, 3 story, basement, 40 x 50 x 123 ft., rein.-con., brick, plain found., 4th St., to Acme Constr., Co., Philcade Bldg., $101,970.

Que., Montreal—FIRE STATION—City, 106 x 115 ft. fire station, Delormire Ave., to Frenette & Freres, Ltd., 2123 Des Carrieres St., $173,000.

UNCLASSIFIED

PROPOSED WORK

Calif., Los Angeles — OBSERVATORY, PLANETARIUM, etc. — Col. Griffith Memorial Fund, c/o Security 1st Natl. Bank, plans by Austin & Ashley, Chamber of Commerce Bldg., observatory, planetarium, museum and science building, Griffith Park. $750,000.

Ill., Brookfield—ZOOLOGICAL—Chicago Zoological Society plans by E. Clark, 6 East Huron St., Chicago, 1 story, 120 x 260 ft. artificial stone. $300,000.

Mass., Worcester—HOME—Jewish Home for Aged, S. Waxler, 390 Main St., plans by Fuller & Delano, 44 Front St., and takes bids late in June, 3 story, 90 x 130 ft., brick, steel, tile, Pleasant St. $150,000. Noted Aug. 21.

Mass., Worcester—HOME—Memorial Home for Blind, J. C. Berry, pres. Bd. Trustees, home, To exceed $150,000. Architect not selected.

N. H., Manchester — HISTORICAL — Manchester Historical Society, F. P. Carpenter, pres., soon lets contract 2 story, basement, 45 x 100 ft., steel, limestone. $150,000. E. L. Tilton, 420 Lexington Ave., New York, archt. Noted May 28.

N. J., Atlantic City—CASINO and STORE—Park View Beachfront Co., H. Cassman, pres., Boardwalk, will not rebuild 2 story, basement, brick, steel, 1723-31 Boardwalk. $150,000. Project abandoned. Noted May 21.

N. J., Newark—RAILROAD STATION—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., bids late in July, railroad station. McKim, Mead & White, 101 Park Ave., New York, archts. Noted Mar. 19.

N. J., Rumson—EXCHANGE—New Jersey Bell Telephone Co., 540 Broad St., Newark, 2 story, basement, brick, steel, Center St. $150,000. Architect not selected.

N. Y., Verplanck—HOME, etc.—New York Urban League, 202 West 136th St., New York, convalescent home and recreation center. $150,000.

O., Cleveland — PRODUCE SALES — Fisher Bros. Co., E. H. Fisher, secy., 2323 Lakeside Ave., plans by George S. Rider Co., engrs. and archts., Marshall Bldg., 1 story, 40 x 220 ft., brick, steel, concrete, East 40th and Orange Sts. $150,000.

Okla., Oklahoma City—STATION—See "Railways, under Oklahoma."

BIDS ASKED

Calif., Los Angeles—LABORATORY—R. K. O. Studios, 780 North Gower St., taking bids part 2 and 3 story, 95 x 140 ft., Class A rein.-con., North Gower St. $175,000. Noted May 5.

Ind., Ft. Wayne — HOME — St. Vincents Orphan Home, J. F. Noll, pastor, bids about June 10, orphans home, incl. school building, chapel, power plant, Wells and Archer Sts. $500,000. A. M. Strauss, 415-Cal-Wayne Bldg., archts. R. W. Rowland, Ft. Wayne, engr. Noted Mar. 26.

N. J., Seabright—EXCHANGE—June 8, by New Jersey Bell Telephone Co., 540 Broad St., 2 story, basement, brick, steel, Centre St. $150,000. Private plans.

CONTRACTS AWARDED

Ill., Chicago—HISTORICAL HOME—Chicago Historical Society, 632 North Dearborn St., general contract 2 story, basement, red brick, limestone or marble incl. library, museum, on 175 x 300 ft. site in Lincoln Park, North Avenue and Clark St., to Lundorff-Bicknell Co., 100 North La Salle St., $500,000. Noted Mar. 19.

Mo., St. Louis—EXCHANGE—Southwestern Bell Telephone Co., 11th and Pine Sts., Forest Delmar Exchange Building, 2 story, basement, 100 x 130 ft., rein.-con., brick, to J. H. Bright Contg. & Building Co., Arcade Bldg. Est. $1,860,000 incl. equipment. Noted Feb. 5.

N. J., Lawrenceville—HOME—E. G. Perrot, archt., 1211 Arch St., Phila., Pa., general contract 3 story, basement, brick, steel addition to Morris Hall, to C. J. Smith Constr. Co., 202 Academy St., Trenton, for Catholic Diocese of New Jersey, $155,000. Noted May 21.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., Oakland — LAUNDRY — Oakland Laundry Co., c/o C. B. Calow, 730 29th St., plans by Miller & Warnecke, Financial Center Bldg., 1 story, mezzanine, 175 x 280 ft., steel, brick, 29th St. $250,000, incl. equipment.

Calif., Pasadena—NEWSPAPER PUBLISHING PLANT—Pasadena Post plans by Bennett & Haskell, 1st Trust Bldg., 2 story, rein.-con., Fair Oaks Ave. $100,000.

Calif., Sacramento — PRINTING PLANT — State of California, plans by M. Sheldon Monadnock Bldg., San Francisco, 2 story, basement, rein.-con. printing plant addition, state capitol grounds. $81,000.

Conn., Waterbury—PLANT—Lux Clock Mfg. Co., 97 Sperry St., manufacturing plant addition $40,000 or more. Architect not selected.

N. J., Bound Brook—FACTORY—Owner, c/o J. N. Pierson & Son, archts., 198 Jefferson St., Perth Amboy, 1 story, basement, brick, steel, $40,000.

N. J., Carteret — PLANT — Amer. Mineral Spirits Co., 205 East 42nd St., New York, soon takes bids general and separate contracts, 1 story, basement, brick petroleum products plant and tanks. $40,000. Private plans. Noted May 14.

N. J., Elizabeth — RUBBER STAMP FACTORY — Fulton Specialty Co., 128 Fulton St., will not alter 5 story, basement, brick, steel, Fulton St. $40,000. Project abandoned. Noted Apr. 30.

N. J., Garfield—LAUNDRY—F. Sciortino & V. Lamendola, Main St., 1 story, basement, brick, steel, Division Ave. $40,000. **Maturity probably in August.** A. L. Vigliante, 40 Passaic St., archt. Noted May 7.

N. J., Hawthorne—ICE PLANT—Sands Bros., 1099 Gaffle Rd., 2 story, basement, brick, steel, Goffle Rd. near Rock Rd. $40,000. Architect not selected.

N. J., Hoboken — BAKING PLANT — Continental Baking Co., Inc., 14th St., altering 4 story, basement brick, steel, 14th St. and Park Ave. $40,000. Bids in. Project in abeyance. Private plans. Noted May 21.

N. J., Jersey City—BAKERY—Manischewitz Co., 2100 West 8th St., Cincinnati, O., baking plant, 51 Bay St. To exceed $60,000. **Maturity soon.** Architect not selected.

N. J., Nutley—FACTORY—G. Swan & Co., 500 Kingsland Rd., 1 story, basement, brick, steel, Kingsland Rd. $40,000. **Maturity probably in June.** Architect not selected. Noted May 7.

N. J., Plainfield—BAKERY—Puritan Bakery Co., E. Brancoti, 286 Terrill Rd., 1 story, basement, brick, steel. $40,000. C. C. Bell, 17 North Ave. E., Cranford, archt. Project in abeyance. Noted May 21.

N. J., Roselle—FACTORY—Roselle Frocks, Inc., 1107 Chandler Ave., and J. Anderson, archt., 251 North Broad St., Elizabeth, soon lets general contract 2 story, basement, 80 x 100 ft., brick, steel, hollow tile, Chandler Ave. $40,000. Noted May 28.

N. J., Rutherford — DRESS FACTORY — S. Cordo, 23 West Erie Ave., will not build 2 story, basement, brick, steel addition. Project abandoned. Noted May 21.

N. J., Spotswood—RUG MILL—Spotswood Rug Mills, Inc., 2 story, basement, brick, steel, $40,000. **Maturity probably soon.**

N. J., Wallington — BAKERY STORE and GARAGE — J. Boruta, 103 Halstead St., 2 story, basement, 75 x 75 ft., brick, steel, Wallington Ave. and Mercer St. $40,000. Bids in. Project in abeyance. Noted Apr. 2.

N. Y., Brooklyn—FACTORY—National Saw Dust Co., R. Brenner, pres., 69 North 6th St., plans by Laspia & Samenfeld, 217 Havermeyer St., 2 story, 25 x 100 ft., North 7th St. and East Kent Ave. $40,000, incl. equipment.

N. Y., Brooklyn — LAUNDRY — Brighton Laundry Co., 587 Sheepshead Bay Rd., plans by J. M. Fenchel, 468 4th Ave., New York, altering 2 story laundry, 587 Sheepshead Bay Rd. $40,000.

N. Y., Brooklyn—PLANT and GARAGE—International Cork Co., c/o I. Adelsohn, archt., 44 Court St., altering 2 story, 100 x 200 ft. plant and garage, Morgan Ave. and Norwalk St. $40,000. Project in abeyance. Noted Apr. 2.

N. Y., Long Island City—OIL PLANT—Triplex Oil Co., Borden Ave. and Creek St., oil distribution plant, Jane and Crescent Sts. $40,000.

O., Ashtabula — MILLS DISTRIBUTING PLANT—Telling Belle Vernon Co., 3825 Cedar Ave., Cleveland, 1 story, 50 x 150 ft., brick, steel, concrete. $60,000. A. F. Gleim, 3825 Cedar Ave., Cleveland, company engr.

O., Cleveland—FACTORY—McKinney Tool & Mfg. Co., A. McKinney, vice pres., 1688 Arabelle Rd., sketches 1 story, 50 x 150 ft., brick, steel addition. $50,000. Private plans.

O., Salem—FACTORY—Parmal Furniture Co., Salem, rebuilding 1 story, recently destroyed by fire, Newgarden St. $40,000. Private plans.

Pa., Scranton—FACTORY—Princeton Rayons, Inc., 150 Madison Ave., New York, sketches factory. $300,000.

Pa., Uniontown — NEWSPAPER PLANT — H. W. Altman, archt., Fayette Title & Trust Bldg., 2 story, 24 x 106 ft., brick, concrete slab, hollow tile, Main St., for Daily News Standard. C. R. Llewellyn, pres.

Man., Brandon — ABATTOIR — English Co-Operative Society, Leeds, England, abattoir. $100,000.

Ont., Toronto—SHEET METAL MANUFACTURING PLANT—Fairgrieve & Son, 50 Dovercourt Rd., plans by A. B. Crealock, 156 Yonge St., and soon takes bids 2 story, 60 x 130 ft., brick, steel top addition. $60,000.

Ont., Windsor — FLOUR MILL — General Foods, Inc., R. K. MacIntosh, mgr., flour mill. $75,000.

BIDS ASKED

Ariz., Coolidge—COTTON COMPRESS—See "Contracts Awarded."

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Factories and Mills (Continued)

Mass., Taunton—FACTORY—Taunton Pearl Wks., 35 Vernon St., taking bids 2 story basement, brick, timber, Ingell St. $40,000 or more. Jackson & Moreland, 31 St. James Ave., Boston, archts. Noted May 28.

N. J., Newark — FACTORY — See "Contracts Awarded."

N. J., New Brunswick—FACTORY—H. G. Bach, archt., 63 Schureman St., bids about June 15, general contract 3 story, basement, 75 x 200 ft., brick, steel, rein.-con. addition, Remsen Ave., for Aplo Clothing Co., Remsen Ave. $125,000. Noted May 28.

N. J., Passaic—DYE WORKS—J. F. Kelly, archt., Post Office Bldg., taking bids general contract 2 story, basement, brick, steel, rein.-con. addition, plain found., Bloomfield Ave., for Passaic Piece Dye Wks., 420 Bloomfield Ave. Est. $40,000. Noted May 28.

Ont., Spragge—MILL—McFadden Co. Ltd., saw mill. $75,000.

Ont., Wellington—CANNERY PLANT—W. A. Best Ltd. soon takes bids cannery plant. $100,000.

CONTRACTS AWARDED

Ariz., Coolidge—COTTON COMPRESS, etc.—Arizona Compress & Warehouse Co., cotton compress, warehouse, day labor. $100,000. Noted Apr. 9.

Calif., Linden — PACKING PLANT — San Joaquin Valley Walnut Growers Assn., 1 story, basement, timber, concrete basement, to J. J. Cavanaugh, 219 North Sutter St., Stockton, $40,000.

Ind., Indianapolis — PACKING PLANT — Armour & Co., 602 West Ray St., general contract brick, steel, to Abel Bros., 8 East Market St. Est. $40,000.

Mass., Brighton — FACTORY — Goldo Brand Confectionery Co., Everett St., altering and constructing 2 and 3 story, basement, brick additions to N. Berman, 33 Wenonah St., Roxbury. Est. $40,000.

Mass., Brighton (sta. Boston) — A. Gonzalazie, 272 Palfrey St., West Roxbury, 1 story, concrete, steel garage, repair shop, plain found., Cambridge and Mayflower Sts., to A. Ferrari, 230 Bennington St., East Boston. Est. $40,000.

Mich., Saginaw—KILN—Saginaw Malleable Iron Div. General Motors Corp., General Motors Bldg., Detroit, 1 story, 80 x 512 ft., brick, steel, concrete, to Austin Co., 16112 Euclid Ave., Cleveland. Est. $500,000.

N. J., Jersey City—DISTRIBUTING PLANT—Sheffield Farms Co., Inc., H. McNabb, engr. in charge, 524 West 57th St., New York, 1 story, basement, brick, steel addition, Ocean Ave., to Deakman-Wells Co., 9121 Bergen Ave. Est. $150,000. Noted Feb. 19.

N. J., Jersey City—GAS PUMPING STATION—Pub. Serv. Electric & Gas Co., 80 Park Pl., Newark, general contract 1 story, basement, 33 x 72 ft., brick, steel, to United Engineers & Constructors Inc., 80 Park Pl., Newark. Est. $40,000. Noted May 15, 1930.

N. J., Newark—FACTORY—Health Products Co., 113 North 13th St., 2 story, basement, brick, steel addition, North 13th St., by separate contracts. $40,000. Private plans.

N. Y., Brooklyn—DAIRY PLANT—Beatrice Creamery Co., 1526 South State St., Chicago, Ill., and its subsidiary Jersey Maid Ice Cream Co., 32 Little Nassau St., dairy plant, 32 Little Nassau St. $200,000 incl. equipment.

N. Y., Mariners Harbor—DAIRY PLANT—Weissglass Dairies Co., 2014 Dorest Ave., 1 story, basement, brick, steel, to Victor Prosi, 64 Merseresu St., Port Richmond. Est. $40,000. Noted May 21.

Texas—PACKING PLANTS—Texas Citrus Fruit Growers' Exchange, c/o J. H. Shary, pres., Mission, plans by H. H. Shary, Harlingen, 1 story, brick, rein. con., at Santa Rosa, $60,000; 2 story, brick, rein.-con., stone, at Harlingen. H. H. Ewing, 1608 Dougherty St., Mission, engr.

Tex., Nacogdoches—CANNING PLANT—J. A. Killian, North Church St., 1 story, 40 x 100 ft. tomato canning plant, brick, corrugated iron, concrete, incl. boiler room, loading racks, equipment, to L. Rulfe, Nacogdoches, $60,000.

R. I., North Smithfield — PLANT—Branch River Wool Combing Co., Branch Village, 3 story, basement, 95 x 170 ft., brick, steel, concrete wool sorting plant and storage extension, to Temple & Crane, Inc., 80 Federal St., Boston, Mass. Est. $40,000. Noted May 14.

Wis., Racine—FACTORY—Modine Mfg. Co., Racine, general contract 4 story, 80 x 111 ft. factory, to W. M. Christensen Constr. Co., Racine.

GARAGES

PROPOSED WORK

Mass., Quincy—Corey Bros., 12 Shaw St., soon takes bids 1 story, 60 x 100 ft., brick, rein.-con., steel garage, concrete found., 756 Washington St. $50,000. Private plans. Noted Mar. 19.

N. J., East Orange—Rocco Realty Co., M. Rousek, mgr., 507 Main St., revised sketches, 2 story, basement, brick, steel, rein.-con. garage, Main St. and North Arlington Ave. $150,000. Noted Mar. 26.

N. J., Hackensack—Bergen Auto Co., E. W. Steffens, pres., 17 Banta Pl., sketches 2 story, basement, 100 x 240 ft., brick auto sales and service building, Main St. and Hackensack Ave. $150,000.

N. Y., Brooklyn — Fredle-Nyse, 149 Van Sicklen St., 102 x 156 ft. service garage, Lake St. and Avenue S. $40,000. W. Richter, 301 Elmwood Ave., archt. **Maturity in August.**

N. Y., Brooklyn—Rae Arons, 1669 45th St., sketches by Kallich & Weinstein, 375 Fulton St., 100 x 100 ft. service garage, gas station, 17th Ave. and 62nd St. $40,000.

N. Y., Brooklyn — M. S. Kaplow, 3114 Avenue M, sketches by I. Kallich, 375 Fulton St., 2 story, basement service garage, West 4th St. and Avenue P. $40,000.

BIDS ASKED

Illinois—See "Residential."

Mass., Melrose—See "Contracts Awarded."

R. I., Cranston (mail Providence)—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Melrose—Eastern Mass. Street Ry. Co., 38 Chauncy St., Boston, two 1 story, basement, brick, concrete, steel garages, workshops, plain founds., Franklin St., day labor. $100,000. Private plans.

N. J., East Orange—W. F. Bower, archt., 437 Main St., general contract 1 story, 100 x 100 ft., brick, steel auto repair shop, laundry, to L. DiGirolamo, Inc., 360 3rd Ave., Newark, for P. J. Bowers & Co., 189 Market St., Newark. Est. $40,000. Noted May 21.

N. Y., Albany—See "Warehouses."

N. Y., Ozone Park—E. P. Mulrooney, police comr. Police Dpt., New York, general contract garage, to Silverblatt & Lasker, $125,990; plumbing, to P. H. Mahr, $7,588; heating, to Telmadelle Plumbing & Heating Co., 1812 White Plains Ave., New York, $6,960. Grand total $140,538. Noted Apr. 30 under "Public."

R. I., Cranston (mail Providence) — H. O. Najarian, 233 Waverly St., Providence, 1 story, concrete block garage, Broad St., day labor. $40,000. B. S. D. Martin, 86 Weybosset St., Providence, archt.

R. I., Providence—F. W. Christy, 303 Chapman St., Cranston, 1 story, rein.-con., steel garage and salesroom, plain found., Reservoir Ave., to Hope Building Co., Inc., 36 Exchange St. Est. $50,000.

SHOPS AND FOUNDRIES

BIDS ASKED

N. J., Newark—REPAIR SHOP—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Everett—FOUNDRY—Warren Fdry. & Pipe Co., 201 Devonshire St., Boston, 1 story, brick, steel addition, to J. M. and C. J. Buckley, 183 Essex St., Boston. Est. $40,000.

N. J., Newark — REPAIR SHOP — Fischer Auto Sales Co., 596 South 11th St., 2 story, basement, brick, steel, 606-10 South 11th St., separate contracts. $40,000. R. L. Pryor, 11 Covernor St., archt. Noted Apr. 30.

POWER PLANTS

PROPOSED WORK

Mass., Methuen — Town, municipal power plant. $50,000. Engineer not selected.

N. Y., Brooklyn—Brooklyn and Queens Transportation Co., 3857 Flatbush Ave. extension, bids in June, general contract sub-station, Ocean Ave. and Avenue H. $40,000. H. J. Kolb, c/o owner, archt. Noted May 14.

N. Y., Poughkeepsie — New York Power & Light Co., subsidiary Niagara-Hudson Power Co., 15 Broad St., New York, soon takes bids 266,000 kva. substation, near here.

Newfoundland, St. Johns—United Towns Electric Co. soon takes bids sub-station on Bell's Island. $100,000.

Que., Montreal — Montreal Light, Heat & Power Consolidated, 107 Craig St. W., substation, Atwater Ave. $500,000.

BIDS ASKED

Ind., Garrett—June 15, by City Council, 2 story, basement, 22 x 74 ft., rein.-con., brick, steel power plant. $42,000. A. M. Strauss, 415 Cal-Wayne Bldg., Ft. Wayne, archts. Equipment desired.

Ind., Ft. Wayne — See "Buildings — Unclassified."

Mo., Macon—June 9, at office L. T. Dameron, Jr., secy. Bd. P. Wks., 750 kw. turbo-generator, 300 hp. water tube boiler, forced draft chain grate stoker, surface condenser with auxiliaries, cooling tower. Baumes-McDevitt Co., Railway Exch. Bldg., St. Louis, engrs.

CONTRACTS AWARDED

Ind., Crawfordsville — City, L. S. Kirtley, clk., general contract rein.-con., brick steel power plant, to Pickett & Gill, 420 Continental Bank Bldg., Indianapolis. Est. $60,000. Noted Apr. 30.

Ind., Shelbyville — C. C. Shipp & Co., 212 Castle Hall, Indianapolis, hydro-electric plant, incl. rein.-con. power house, 238 ft. concrete dam, 750 ft. retaining wall, gate house, concrete spillway, on Flat Rock River, 9 mi. from here, to J. G. Karstedt, 632 Architects Bldg., Indianapolis, $76,984. Noted Apr. 2.

Neb., Sutherland—City, P. N. McKinley, clk., 1 story, 32 x 90 ft., brick, tile power plant, to Fairbanks-Morse Co., 9th and Harvey Sts., Omaha. Est. $40,000.

Neb., North Platte—Northwestern Pub. Serv. Co., T. T. Parker, 712 Bankers Life Bldg., Omaha, high pressure steam station, installing machinery, North Platte River east of here, to Peter Kiewit's Sons, 911 Omaha Natl. Bank Bldg. Est. $500,000.

N. J., Convent Station — Fanning & Shaw, archts., 49 Ward St., Paterson, general contract 1 story, basement, 68 x 95 ft., brick, steel power house, for St. Elizabeth's College, to E. M. Waldron, Inc., 40 Park Pl., Newark; plumbing, to F. A. McBride, 327 Grand St., Paterson; heating, to A. B. Barr, 30 East 42nd St., New York; electrical work, to P. Spross, 246 Chancellor Ave., Newark. Noted Apr. 16.

N. Y., New York—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., constructing 10th Street, Sub-station, to G. H. Haley Co., 60 East 42nd St., $21,700. Noted May 7.

Tex., Caldwell—City, municipal power plant, incl. power house, double unit with 2 oil burning engines and 2 generators, to Fairbanks, Morse & Co., 160 Varick St., New York, and 1713 North Market St., Dallas. Est. $40,000.

Tex., Eagle Pass—Central Power & Light Co., Alamo Natl. Bank Bldg., San Antonio, general contract, 140 x 190 ft., rein.-con., brick, stone, steel, power house, near here, to Bart Moore, Inc., Milam Bldg., San Antonio. $260,000. Noted Apr. 30.

WAREHOUSES

PROPOSED WORK

Calif., Oakland—Howard Terminal Corp., 1st and Market Sts., plans by Reed & Corlett, Oakland Bank Bldg., (1st unit) 1 story, brick, steel warehouse, 1st and Market St. $40,000.

Mass., Worcester—North Eastern Storage & Distributing Corp., J. S. Geraty, pres., 93 Grafton St., revised plans probably by Howe & Lescaze, 250 East 43rd St., New York, 3 and 6 story, basement, 180 x 640 ft., steel warehouse, distributing station, Grafton St. and Keefe Pl. $900,000. Noted May 21.

N. J., Clifton—Erie R.R. Co., G. S. Fanning, ch. engr., 30 Church St., New York, revised sketches 2 story, basement, brick, steel freight house, Mina, Carolina and Rosalie Aves. $150,000. Noted Aug. 21, 1930.

N. J., Long Beach — Bitrodite Paving Co., Commercial Terminal Bldg., Phila., Pa., 1 story, basement, brick, steel industrial warehouse, Branchport Ave. $40,000. **Maturity probably soon.** Private plans.

N. J., Newark—New Jersey Bell Telephone Co., 540 Broad St., 6 story, basement, brick, steel, warehouse, garage, Fabyan Pl. and Loretta Ave. $750,000. **Maturity in September.** Voorhees, Gmelin & Walker, 101 Park Ave., New York archts. Noted May 28.

N. Y., Brooklyn—H. M. Hillman, 188 Flatbush Ave. extension, plans by Erling-Owre, 53 Fort Hill Circle St., St. George, storage and brass and copper products factory, Flatbush Ave. extension and Myrtle Ave. $40,000.

N. Y., New York — Randik Realty Co., I. Koch, pres., 206 Lexington Ave., bids in June, altering and constructing storage, stores, 649 Lexington Ave. $150,000. B. Whinston, 6 East 46th St., archt. Noted Apr. 28.

Ore., Salem—Oregon Wool & Mohair Co., R. H. Stewart, genl. mgr., warehouse. $200,000. Private plans.

BIDS ASKED

N. Y., Elmsford—June 23, by A. W. Brandt, comr. Hys., Albany, county storehouse and county assistant's office, Westchester Co.; adv. E.N.-R. June 4.

CONTRACTS AWARDED

Calif., Oakland—City of Oakland Port Comn., 424 Oakland Bank Bldg., pile founds. for Ware house C on Outer Harbor, to Duncanson-Harrelson Co., De Young Bldg., San Francisco, $31,815. Noted Feb. 5.

Mass., Boston — R. T. Adams Co., 108 Arlington St., 3 story, brick, concrete block storage building, concrete found., Arlington St., to W. A. Wentworth Co., 107 Pacific St., Cambridge. Est. $55,000.

Mass., Salem—New England Fuel & Transportation Co., 250 Stuart St., Boston, 1 story, concrete storage plant, Canal St., to Koppers Constr. Co., Koppers Bldg., Pittsburgh, Pa. Est. $45,000.

N. J., Asbury Park — Wilson & Co., 900 Springwood Ave., general contract altering 1 story, basement, brick, steel cold storage plant, to Hall Carpenter Co., Inc., 917 3rd Ave.; steel and ornamental iron, to Park Irons Wks., Evergreen Ave., Neptune City. Est. $40,000.

N. J., Weehawken — Union Lines Terminal Co., c/o O. F. Schlick, 37 Hamilton Ave., Kearny, poultry terminal, to Fisher-Williams Corp., 110 East 42nd St., New York. Est. $1,250,000.

N. Y., Albany—Sun Oil Co., 24 James St., warehouse, office, garage, lubricating oil pump house, double loading rack, storage tanks, to Hughes-Foulkrod Co., Schapp Bldg., Phila., Pa.; driving well to J. B. Stewart Co., Schenectady; railroad sidings, to W. C. Briddell Co., Phila., Pa.

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See proposal advertising on page 127